

Woodland Moments

By JOHN LINDSEY BLACKFORD

Illustrated by Lee Willenborg

WOODLAND moments—golden moments, haunting us forever after with their fadeless beauty; ecstatic moments, poignant with incomparable song; expectant moments, athrill with the disclosure of wildwood secrets; elemental moments that stir the emotions as does some cry from the primordial wilderness. Woodland moments, they come, but never go.

They may come at dusk when the first bat skims the sylvan pool and dips to drink; or when a muskrat slides from the sedgy marge, or may be found in the moving wedge of ripples that points out a beaver upon the darkly mirrored surface of a lake, while the purple light fades in the west and the bordering firs loom large in the descending dark. Sometimes adventure is in the scurrying brown form of a weasel as he moves swiftly from cover to cover, or it may be a thrill as a crying killdeer glides above the waving tules.

These are the elixir of full living for all who know kinship with the habitants of the wild. Our questing steps seek such meetings in trackless fir thickets, carry us exploring on snowy heights, trace for us endless marshy margins, lead us wandering through sunny cottonwood groves that shade shallow, leaf-lined pools, and return us late across the moon-daubed darkness of the forest floor. Count too, we must, those times of reflection and communion when we rest beneath the vaulted boughs of some dim, gigantic grove, or dream beside a silent stream. With each joyous return to forest, field, and wood we feel our ancient kinship with the wild and know that truly we have come home.

One day I stood upon the ramparted lower slopes of a steep mountain. The stiff breeze blowing up the lake

was exhilarating, and upon the air was the redolence of conifers. Before me shimmered an expanse of liquid blue, while beyond and precipitously, on all sides, rose the overpowering peaks of the Continental Divide. Thrusting into the lake was a long, rock-girt promontory. Its point lay about opposite, and between lapped the ruffled blue waters of a deep embayment. The whole was a scene of uncommon beauty and impressive grandeur.

Presently, quartering across the wind that swept up the narrow bay, there appeared a Clark's nutcracker making for the head of the promontory. The wind varied, coming in strong puffs so that for a brief space his goal, to the onlooker, seemed unattainable. The line of the pine

crow's flight now showed a marked curve landward, yet there was strength in his wide wings and he gained toward the farther shore. Those flashing pinions, the soft smoke-gray, white and black of his plumage above the blue water, had added the final touch that life and motion alone could bring to that rare setting.

After climbing, on a clear afternoon, to the high, openly-wooded shoulder of a mountain, I dropped upon its needle-strewn and grassy slope to recover breath. Directly below, the mountainside fell away steeply into a deep, dry draw, timbered with yellow pine, and made dense in the depths of the ravine by Douglas fir. Carelessly I snapped a brittle stick picked casually from the dry ground. It was not surprising that the result was the whistled warning of a startled deer. The surprise came when I saw three white flags go up far beneath on the opposite hillside, the whistled snorts of the others joining in quickly with those of the first buck.

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"SOMETIMES ADVENTURE IS IN THE SCURRYING BROWN FORM OF
A WEASEL AS HE MOVES SWIFTLY FROM COVER TO COVER."

The deer were bounding out of a natural clearing and so perfectly did they blend with their surroundings at that distance that when one lowered his flag and paused he seemed to vanish completely. I might have lingered for an hour, and, had I not given them alarm, would in all likelihood never have become aware of their presence. On the other hand, so readily might their browsing ground be scanned from my position that the instant the whitetails showed their undercolor, their moving forms drew attention.

Another time I lay on my blankets at the lower end of a lake among hills and far from other aquatic haunts. It was the season of fall migration. A small wedge of ducks coming toward the line of sedges was, then, not unexpected. I raised on elbow and, at the movement, the small flying squadron wheeled, curved away in a descending glide, and struck the glassy surface with a long splash some two hundred yards away. There they remained silent with a single exception. One of the aerial racers, in oncoming, unaltered flight, alighted just beyond me upon the narrow meandering overflow of the lake.

This marshy reach was obviously the inviting destination of the voyagers and the lone arrival proceeded to enjoy it. Yet the bird felt the absence of his companions, saying so with a loud, querulous quack. Then he abandoned his shallow diving and feeding and commenced an exploratory search of the waterlane. Turning at length, the lost duck followed its winding course to the open water, his progress behind the screen of swamp grass recorded for me by his lonesome and questioning quackings. The cautious group on the lake gave no answers and he quietly rejoined them.

The flock consciousness and instinct of waterfowl, as we know, are highly developed. In this instance, however, one member of the flock apparently got his signals mixed, or, on the contrary, it may only have been the case of a particularly unwary or of an injured individual.

A memorable moment in the woodland may be but a few fleeting seconds after an hour of watching and wait-

ing. The scene before me on an ideal morning in June was one of dreamy beauty. A stream meandered between marshy banks, lined and shaded here and there by willows, silvery green, dense of foliage, delighting by their curved and rounded symmetry. Winding away from the watercourse, curving, circling and rejoining it, ran open lanes among the willows, old channels long since abandoned. Tall rank grasses and lush sedges now claimed them. They islanded clumps of the silvery-leaved willows, or wove inviting aisles amidst the shrubbery. Low green hills guided the stream in its shallow valley to a once secluded lakelet. There cat-tails and reeds welcomed the little creek to their green coves and boggy reaches. For two miles upstream from its inflow this waterway was like a picture of fancy.

I had delayed midway along the stream course, wrapped in its charm. Then from between two willow "islands" and down one of those winding aisles there came, leisurely breasting the tall and waving grasses, a doe and spotted fawn. They did not perfect the beauty there for already it was perfection. They did add to it, and made the idyll complete.

Such moments as these from life outdoors enter into the filaments of one's being. Incidents they are that become the incentives to deeper study; experiences that lead to a completer understanding. Ever in our association with Nature we feel that we are touching the true wave-length of our existence, sense instinctively that here we shall find that harmony with things about us that we are always seeking.

Various indeed are the moods and situations in which wild creatures present themselves. Humor, most certainly, is not lacking; although a giant redwing and his mate that I recall evidently viewed the occasion of our meeting quite differently.

I had crossed a meadowland that stretches away for some distance from the northern shore of a well-populated pond. Beyond the farthest green wall of cat-tails and border growth rose forested slopes. With each step the moist

soil was fast becoming oozy. To the left, however, instead of sinking away beneath several inches of brown water and changing to the quaking morass where cat-tails flourished, the land lifted, dried itself of the algae-laden, half-stagnant water and, forming a dry, narrow, and stony ridge, ran parallel thus, close by the pond, for a hundred yards. Between this little ridge and the open water aquatic plants crowded together in dense ranks, lush and green. A distant flotilla of ducks rode the surface while other waterfowl had sought inlets in the irregular shore. Waterweeds rising from the black bottom through the dark water attracted to their emergent tips masses of brown algae scum. There happy mudhens dabbled. Elsewhere pads of the yellow pond lily floated idly. Blending with the witching song of the western yellowthroat I heard, as I neared the ridge, the jolly, mellow *o-ka-lee-o* of the doughty redwing.

A watchful minstrel, he was quickly a-wing, beating upward, swinging around over me. His high-pitched whistling followed my path of investigation, sounding alarms to his wife who was chucking in the undergrowth. The long, low elevation, crowned by a scattered tangle of serviceberry, thorn-apple, western chokeberry, willow and wild rose, was claimed unreservedly, I could see and hear, by the dauntless blackbird. Finding me undeterred he circled away, flew the bounds of his demesne, piped again his ownership to the marsh, and returned to warn against further intrusion. Brilliant in vermilion and gold epaulets, this shining black knight of the cat-tail coves and watery reedlands is ever ready to joust before his mate, wearing, in the field, however, his own rather than his lady's doubtful colors.

Having once escorted the intruder beyond his boundaries the redwing's agitation and excitement increased at my return. Obviously the proud fellow's nest was to



"ONE OF THE AERIAL RACERS ALIGHTED JUST BEYOND ME UPON THE NARROW MEANDERING OVERFLOW OF THE LAKE."

be found in some thicket of that swamp-hemmed ridge, rather than in concealment among the reeds. My squishy progress was now by the pond, as near to the margin as one might come, and there I flushed an unoffending bittern who quickly became the awkward victim of the aroused redwing's indignation.

All the pent up anxiety of that perturbed pair of blackbirds was loosed, it seemed, within the next moment or two. Before the large thunder pumper had risen more than a few feet above the marsh a bright-winged, black fury assailed him, and in several successive aerial dives drove the bittern down until his broad, flapping wings ponderously beat the tall grass tops. Deserting him when at last a bewildered croak escaped the confused bog drummer, Master Redwing circled about triumphantly. The bittern, relieved of his assailant, lifted weightily, hastened along the marge, and dropped to cover far off amidst the cat-tails.

Scarcely had I understood the details of that swift drama than I sighted Madame Blackbird before me in rapid stern chase of some small brown bird. It was anything but a matter of loitering as the two sped past. And then the iridescent male left the perch

where he rested momentarily to resume his whistling overhead. It was then for me to decide that my urgent interest lay in observing the departed bittern, yet that may not have been redwing's view of my leave-taking. Truly, I think, it must have been a prospering and precocious nestful of youngsters that inspired such a field day.

The caution and cleverness that commonly mark the lives of the hunted is well shown by an incident of last winter. I "jumped" three deer from their forms, and, startled, they bounded away through the tamaracks and bare birches into the denser, snow-wrapped evergreens. Nevertheless I continued on my way eastward, noting that the trio had fled directly south. I gave the accidental en-

counter no further thought. Had I not stepped several minutes later into one of those open avenues that here and there divide the loftier forest growth, the deer would have fled my mind as swiftly as they had my trail. Then, however, the momentary clatter of a displaced rock from the hillcrest to the left, whence the snow had vanished under the early March sun, drew attention. Visible for but the briefest second or two, glimpsed through that high aisle in the treetops, the three fleeing forms came to my sight once more. I should never have expected them there.

It was evident now, following upon that chance revelation, that the wily whitetails had executed a most elusive maneuver. Retreating from a suspected enemy in a southerly direction, they had swerved to the east, coursed far

ahead of me, and when seen on the left they had reversed their direction to mine and were topping the hill on a favorite trail, racing away westward. Had not a pause or two on the trail delayed me, there would have been no observer at that advantageous spot to discover the three fugitives in their deceptive flight.

During these moments of meeting with wild things, during our days in woodland and thicket, timber and borderland, we gain in understanding. In her infinite variety we find Nature of never failing interest and wonder; intimate as we may become with her secrets there yet remain for us new revelations. Here then, ever, is the font of an abiding faith; woodland moments—they are treasures never locked from human view or lost to memory.

Shower By LAWRENCE R. HOLMES

The rain comes drilling down through shrub and tree;
It spatters from the roofs in a fine spray;
The glutton gutters swallow it with gulps,
And slender drains are choked with its effusion.
It lies in luscious puddles on the lawns
And saturates the garden loam. It floods
The self-effacing earth-worms from their caves.
Then, quick! the mad-eyed lightning stings the sky,
And the lusty Thunder-god in fury bellows.

A Miniature Evergreen Vine

By VICTOR H. RIES

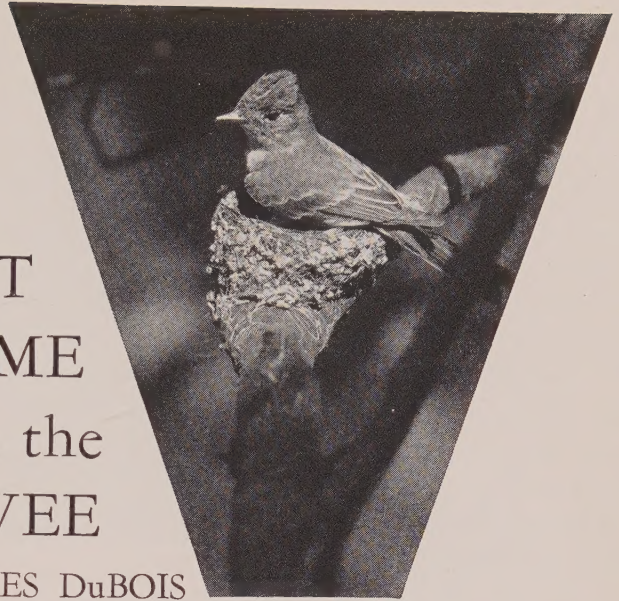
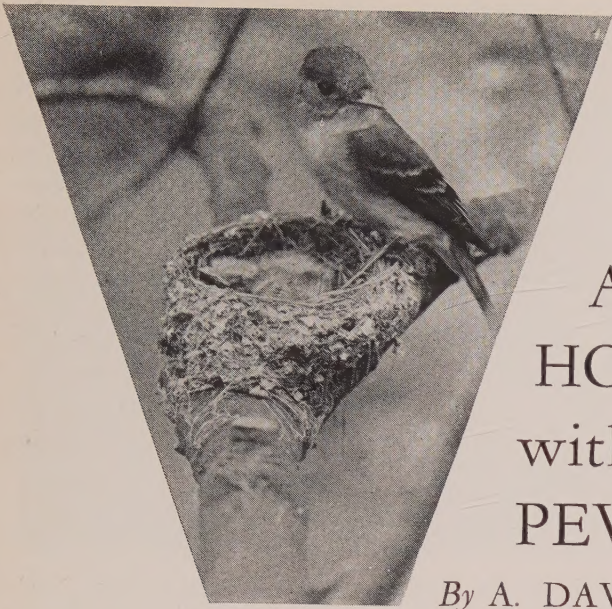
HOW OFTEN have we wished for a small vine to soften the effect and decorate the base of a sun dial or bird bath? When we plant English ivy we find, unless we are continually pruning, that it soon hides the entire feature. The same is true of the ordinary wintercreeper, and Boston ivy; Virginia creeper and clematis are worse yet.

There is, however, one small vine that is ideal for this purpose, but which we see all too seldom. It is nothing new; many nurseries have it. The name is *Euonymus radicans minimus*, or baby wintercreeper, although most nurseries sell it as *Euonymus kewensis*.

A dainty little evergreen vine, it seldom grows higher than twelve or eighteen inches, clinging as it grows. The individual leaves are not more than three-fourths of an inch in length and less than a quarter-inch in width. The accompanying photograph illustrates five or six years' growth about the base of a sun dial.

This same little plant may be used in the rock garden, or in the wall garden. Some gardeners use it to cover the margin of the pool. You will no doubt find a number of other uses for it, once you have it in your own garden.





AT HOME with the PEWEE

By A. DAWES DuBOIS

THE WOOD PEWEE AND HER HOME
At the left the mother bird stands guard on the edge of her nest and, at the right, protects the eggs, seen below, from the intrusion of a shaft of sunlight



THE WOOD PEWEE, *Myiochanes virens*, has a summer home in almost every wood and grove throughout the eastern part of North America and as far west as the plains and north into southern Canada. He is a sombre plumaged little bird belonging to the Family Tyrannidæ, the tyrant flycatchers, all members of which are insect-eaters with the habit of catching their prey on the wing. The flycatcher sits on a dead twig, where the view is not obscured by foliage, to watch for passing insects, which he is able to see at a remarkable distance. Frequently he makes a sally into the air, and we may hear the snap of his broad bill as he closes it over the flying prey.

Although similar in size and appearance to the more common phoebe, the wood pewee is readily known by his pleasing, pensive notes. Most human listeners think of his gentle lay as a "sad, sweet song".

The pewees arrive late in the spring and leave for the South rather early in the fall. The nest is saddled on a nearly horizontal limb. It is a notable piece of avian architecture, small and shallow but compactly built, and is decorated with lichens that tend to prevent its discovery. The walls are thick but the bottom is quite thin, the surface of the branch often serving as part of the nest floor. Such a structure is not easily distinguished from a knot on the limb of the tree. The nest shown in the photographs was only three-fourths of an inch deep, and two inches in internal diameter.

So small a nursery betokens a small family. The number

of eggs is usually three, sometimes four. The handsome eggs are cream-colored, blotched and spotted with brown and lilac-gray in a wreath around the larger end.

Bird photography under the canopies of the woods is usually a trying experience. Patience is a large ingredient in the formula for satisfactory results. The photographs of the wood pewees reproduced here were the result of a fortunate coincidence—a nest scarcely twenty feet from the ground, in an open grove, close to the author's home. It was a

replacement for a nest nearly three times as high and quite inaccessible, which for some reason had been abandoned.

The foundation building of this new nest had just begun when the builder was discovered at work, on July 4. The work was proceeding on a long slender limb of a red oak at a place where a narrow fork occurred, sixteen feet from the trunk of the tree. Some parts of the building material were being taken from the ruins of the abandoned nest.

A rigid support for the camera was provided by constructing a shear of two long poles, bolted together near the top. The slender limb was lashed into the crotch of the shear and a long ladder was erected there. The camera, mounted on the top of the ladder, was enclosed in a box-like covering of dark green cloth stiffened at the front with cardboard. The nest was shaded during most of each day; but there were intervals when a shaft of sunlight came through to the nest, making "slow instantaneous"

BOTH PARENTS ARRIVE WITH FOOD

And with this wealth of provender at hand the lone youngster seems already to have had a large meal

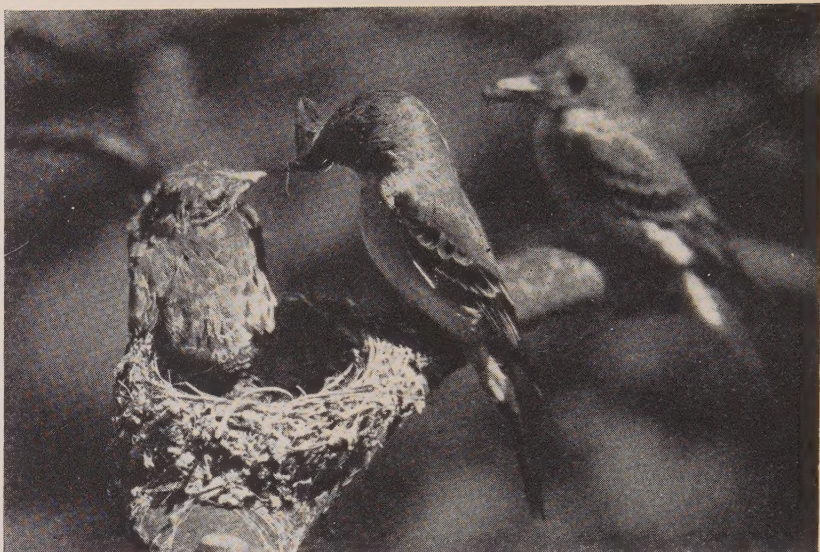
exposures possible. A twig that stood up from the limb in front of the nest was removed before making the photographs.

During the last day or two of incubation the parent birds were very watchful of the eggs. On July 26 I watched them stand together looking at them. The next day the first egg hatched; and again the two birds came together to look into the nest, one of them remaining for some time holding a small insect in the tip of her bill. A little later, upon peering from the top of the ladder, I could see a bit of animated fuzz beside the two remaining eggs.

Only two eggs hatched, and one nestling was successfully reared. By the time this nestling was one day old it appeared to have twice its original bulk—an odd looking bit of bird life with tufts of down on head and back. As it grew older the feedings were quick and business-like:

parent arrived, head went up, moth went in, head went down—all in a moment and without the least ado.

At the end of ten days the nestling was quite well feathered; it fluttered, stretched, and preened repeatedly between naps. In the forenoon of August 11—at the age of fourteen days—it ventured forth into the wide world attended for its first solo flight by its excited parents.



Ash-Throated Flycatcher *By SAM AND GLADYS KNIGHT*

NOT as handsome as his cousin, the Arizona crested flycatcher with the flashing lemon colored breast, the ash-throated flycatcher is, nevertheless, a beautiful bird and a welcome citizen. Certainly he eats his share of insect pests. Usually taking his station on a telephone wire, but sometimes on a housetop or tree, he swoops out in short, graceful flights, catching his prey in midair and returning again and again to almost the exact point of departure.

He is one of those we call our summer birds in Arizona. He returns in spring from his winter home in Mexico or Central America, and remains throughout the summer.

Many of his brothers and sisters continue on northward, some as far as Montana.

Although his principal business in life seems to be decimating the insect population, he does deign to avail himself of the drinking and bathing facilities we have provided. A small pool fed by the constant drip of a nearby faucet is attractive to most of our wild friends, and offers almost our only opportunity for summer photography of birds. Our problem is to sit so quietly as to appear a part of the landscape for as long as is necessary. The camera is set in full view and about four feet from the pool and is operated by a ten-foot cable release.

Marihuana

The Mexican dope plant is the source of a social problem

By CLAIR A. BROWN

Associate Professor of Botany,
Louisiana State University

STAMINATE PLANT OF MARIHUANA

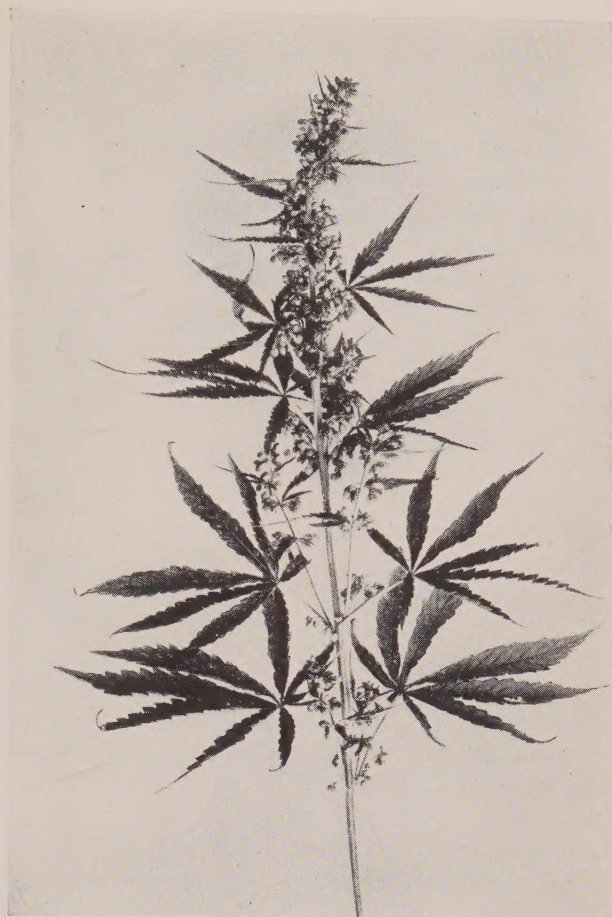
It can readily be identified by its leaves, which are palmately compound and with marked serration. The upper surface of the leaves is rough and on the under surface there are hairs. The flowers are also distinctive and easily recognized

MAN has turned the products of the soil to many uses and produced from them many things, from rubber tires to perfumes. Most of these uses have been good, but now and then the properties of plants have been put to destructive uses. One of these is marihuana, whose name has lately gained the newspaper headlines and won attention in the newsreels because of the drive against traffic in the narcotic drug that bears the name of the plant, and which comes from a resin it produces.

To those fighting to break up the distribution of illicit narcotics marihuana is a social problem. To the botanist it is an annual herb that grows from three to fourteen feet tall. In order that you may know it when you see it, the botanist will tell you that the leaves are palmately compound with five to seven, and occasionally eleven, leaflets, which may be alternate or opposite on the same individual. The margins of the leaflets are coarsely serrate, and the tips and base are long and sharply pointed. The stem and foliage are pubescent with curved hairs. The upper surface of a leaflet is definitely roughened. The staminate and pistillate flowers are borne on separate plants. The staminate flowers are in axillary panicles with five green sepals and five stamens. The petals are wanting. The pistillate flowers are solitary in the axils of the leaf-like bracts. The staminate plants have an elongated, pyramidal inflorescence, whereas the pistillate plants appear dumpy with a compact, flat-topped inflorescence.

The plant, *Cannabis sativa*, is a native of India, but has been introduced into many parts of the world. It apparently can grow under a wide variety of climatic conditions and soil types, and in many places is considered a weed. It has been cultivated in limited sections in Kentucky, Indiana, New York, Wisconsin and California for its fiber—hemp. In fact, it is probably more widely known as the hemp plant or red root than as marihuana. The cultivation of the plant for hemp has declined in late years, but the seed is widely used in poultry feed and is also pressed for an oil.

In India the plant is cultivated for the fiber and for the



narcotic resin. Apparently the plant is peculiar in that it does not produce the narcotic resin in quantity everywhere it is grown. There are definite statements that the resin is produced only in warm climates or under tropical conditions. But there is evidence that plants growing under northern conditions apparently produce some narcotic resin.

As a drug plant, it is known under many names in addition to marihuana, or marijuana, or marajuana, which are three spellings. The names vary according to geographical location, and the names may be used for the plant itself, for the preparations made from it, or for both. Some of these names are guaza, ganjah, hashish, bhang, charas (India), momoka, kanab, siddi, sabsi, manzoul, moogoun, esar (Turkey), chisa (Tunis), djambo (Brazil), as well as Indian hemp, *Cannabis indica*, *Cannabis americana*, and *Cannabis africana*. The last three names are used in the drug trade to designate the source of the product. Material from India apparently contains the most narcotic resin. The crude material is sold in three forms to the lawful drug trade—first, the pistillate flower tops with their resin, which bring the highest price; second, the resin, which is knocked or scraped off and kneaded into balls; and, third, masses of leaves with their resinous deposits. The drug *Cannabis indica*, or cannabin, is a mixture of two alkaloids, a volatile oil and a strong narcotic resin; these have not been isolated, purified, or chemically identified. Physicians sometimes prescribe this drug for relief in migraine, neuralgia, hysteria, spasmodic

THE PISTILLATE MARIHUANA

There is a marked and interesting difference in the flowers on the two forms of this plant

cough, and in preparations for intestinal disorders.

In the illegal trade the narcotic resin is prepared to be smoked, inhaled, ingested as a sweet, or as a drink. Bhang is a liquid preparation frequently sweetened or spiced to be used as a drink. The resin is extracted with butter and goes into the preparation of candy, preserves, and sweetmeats with various kinds of nuts. As a smoke it is used alone or mixed with tobacco and other adulterants. The effect of the resin is stronger when eaten than when smoked. In muggles, as the marihuana cigarets are called by the peddlers in Louisiana, the foliage, small stems, and flowers are used. In this state severe penalties are imposed for the growing, sale, or possession of the plant or its extracts or compounds.

Our knowledge of the effects of this drug on man is imperfect. Prior to 1930 it had received only sporadic medical attention. It appears that it is a distinct depressant of the brain and spinal cord activities. It acts slowly and continues for a long time. The resin has a stimulating and intoxicating effect, which is frequently called cannabis intoxication. Small quantities produce a pleasant excitement, which passes into delirium and catalepsy if the quantity is increased. Large quantities are definitely poisonous. Individuals react differently, sometimes periods of exaltation and hilarity are exhibited; at other times, hallucinations and premonition of impending death seize the victims. It destroys time perception so that a minute may seem as long as a day, or an hour only a minute. A continued use of the drug is said to produce a deterioration of the mind, and a weakening of memory.

In the last few years officials have been seriously concerned with the increased use of the drug. Medical men and scientists have disagreed about its properties, and the danger following its use. Some have a tendency to minimize the influence of marihuana, but the evidence is accumulating that it is a breeder of crime. The stimulation from smoking marihuana cigarets has led many in-



dividuals to take part in violent crimes. It apparently releases natural restraint and gives a false courage. The smoking of marihuana is spreading to people who hitherto have not been users of drugs. One of the worst features concerning it is the activity of peddlers in introducing it to high school students, with the resultant destruction of moral standards, in order to create new outlets for their nefarious trade.

H. J. Anslinger, Commissioner of the Bureau of Narcotics in Washington, recently released the following figures concerning seizures of marihuana: In 1936, thirty-nine states reported to his office 338 seizures totaling 5892 cigarets, and more than three tons of bulk marihuana, and the destruction of 181,225 pounds of growing plants. Twenty seizures in Louisiana, for example, yielded 1217 cigarets, 1195 pounds of bulk marihuana and destruction of 10,600 growing plants.

SPRING IN TENNESSEE

By HELEN LILIENTHAL

Believe not this wind of early April,
So warm, so moist, so subtle
As it blows against the heart.
There is still snow to follow, and cold rain,
And raw, gray days. March has not shaken out his quiver.
What though the bells of the forsythia
Swing bravely bright against their tumbled stems,
Or that the hyacinth scatters handfuls
Of blue pearls over the pallid grass.
This is not spring but winter grown senescent,
Rheumy-eyed and feeble but living still.

Thrills in the Wild

*Some experiences
with black bears
and grizzlies in
Western Canada*



By
G. B. MITCHELL

ONCE THEY HAVE COME IN CONTACT WITH MAN AS AN EASY SOURCE OF FOOD, BLACK BEARS BECOME BEGGARS OF FIRST RANK

NO ONE can spend a number of seasons in the mountain fastnesses of western Canada without coming to know the creatures the Stoney Indians call O'zinjah, and which we call bears. As a rule, one's contact with the black bear often has a humorous angle, but I do not recall a single incident in which the grizzly was a leading actor that he played the part of comedian. Bear stories, however, whether of one's own experience, or of those of friends, seem ever to stand retelling.

Tom Wilson, the pioneer guide who first discovered Lake Louise, chuckled mightily as he told me one day of guiding an English sportsman through the mountains.

"It was a sorta combined sightseein' and huntin' trip. The Englishman packed a camera an' binoc-lars, an' I had all the grub an' my rifle. One place whar we made camp, his nibs left me to stroll off to a clearin' on ther mountain side an' git a view of some scen-ry. 'Twas only a short time when I heard him a'yellin' as if ther Devil war after him. Pickin' up my gun, I run out his way an' thar I found him shinnin' up a big fir tree with a sizeable black b-ar a'followin' of him." Tom grinned as he continued:

"He had a good start on the critter who climbed slower an' more cautious, so I thought I'd watch ther fun fer 's long's it war safe. Up went the Britisher until he finds a big overhangin' limb an' then, movin' backwards, he crawls out among its shakin' branches. Mrs. B-ar—fer it war a female animal—reached that limb, an' balancin' herself careful, starts out on that limb. 'Tween the two of 'em that limb sagged an' sagged. Spottin' me, his nibs yells, 'Oh, I say, are you there? If yer don't shoot the bloomin' beggar an' shoot him quick, the both of us is

a'goin' to fall from here an' break our bloody necks.' Well, he was a'payin' me ter look after him, an' a job's a job." Tom winked one weathered eye at me and put his pipe back in his mouth.

For a while during the early part of last season, I was suspected by one of the wardens in Yoho Park of doing a bit of promiscuous shooting. He had caught sight of a black bear whose flanks were a vivid red. "Only an Eastern dude," he declared, "would take an unlawful shot at a bear like that and do such a poor job." So he had to be told what a mess that bear had made for us. Emerging from his hibernation in the late spring, desperately hungry, Bruin had smashed in the back door of our cook house and helped himself. He had broken into and scattered some two hundred pounds of flour, sugar, rice, oatmeal, baking powder and what not. He had pried into numerous tins.

A bear's senses of smell and hearing are, of course, remarkably keen, but his sight is below the normal of most wild animals. When this pilferer came to several cans of house paint, he evidently did not read the labels. One of the cans he tore open was filled with bright red paint. The taste was disappointing, but he must have liked the color for he sat down in it. Indians on the war-path smeared their faces with red; that bear merely reversed their custom.

At Lake O'Hara, a jade-green jewel nestling in a high valley completely surrounded by snow-capped peaks, there was a full-grown bear that came every day to snoop around our log cabin camp for choice bits of garbage. Sid Brewster, the proprietress, owned two large mastiffs that worried this bear continuously. He was an ugly old



A FULL-GROWN BLACK BEAR WANDERED INTO CAMP FOR FOOD

One ransacked a cabin during the winter, pried open a can of red paint and, having sat in it, caused the author to be accused of illegally taking a shot at bruin

brute, but he had a handsome coat of fur and it occurred to me that, with the protection of the two dogs, I could make some close-up photographs of him.

On one of the bear's visits I went out in company with the dogs to get as near to him as possible while they held him at bay. But only for a moment would Bruin hold his ground; then he retreated slowly toward the dense forest. On the edge of the woods, the bear backed against a large rock, sat up on his haunches and with incredible swiftness struck at the dogs with his fore paws. He did not appear to pay me the slightest attention while I made my pictures. The mastiffs avoided those long sharp claws. However, only a week later, that same bear, with one terrific sweep of his paws, caught both of the dogs and crushed them.

Game wardens say that once a bear has acquired a taste for white man's food, he becomes a persistent pilferer and nothing will cure him. Coming up with a friend through Kootenay Park one afternoon, we stopped at a game warden's cabin. Sending his young son in for him, we waited. Finally, the warden came out, minus his coat and shoes and rubbing sleep from his eyes. We joshingly accused him of leading a lazy life for a game official.

"No," he said, "you-all won't think I'm lazy for a'sleepin' in broad daylight, when I tell you I've been up three hull nights a'tryin' ter git a grizzly that's bin stealin' grub from a construct'n camp a half mile down this here road. I've shot time an' time again at that b-ar but 'twas too dark to git a good sight on him."

"What do you want to shoot him for?" inquired my friend. "Don't you realize that if you wardens kill any more bears we won't have any left around here but the black beggars that come out on the highway to whine for food from the autoists. Why don't you make a cage, trap him and let him loose in new territory?"

"Well," mused the drowsy and still half-asleep warden, "I 'spose it could be done, but it wouldn't cure that there b-ar none. He'd still be jest as big a thievin' critter wherever I might leave him."

How much sense of humor black bears have I am not certain, but their cubs, who get rather severely cuffed and buffeted around by their elders, seem to take it all in a spirit of fun. Some of us who are interested in motion picture photography have discovered that most intimate close-ups can be made if one finds a tree stump in which bees are storing their honey for the winter. In satisfying his appetite for sweets, Bruin cares not how often the bees sting him, nor does he mind a camera. It is not well to place it within reach of his paw for he might also suspect it of containing sweets. It is fun watching a bear extract the last bit of sweetness from the tree trunk. He will stand on his head, force his paw down into the deep hollow, smear it with the sticky substance and then sit up and lick his claws and furry paw. When his stomach is overloaded with sweet stuff, he noses into ant hills and obtains a counteracting acid by devouring those tiny, acidulous creatures.

In the summer months, black bears feed on certain roots, bulbs and on the mountain wild fruits—blueberries, crowberries and the picturesque red berries of the saskatoon. As fall comes early in the higher altitudes, September finds the bear, particularly the grizzly, displaying his carnivorous tendency for fresh meat—for a more sustaining diet of marmot and gopher, in order to prepare himself for his long winter hibernation. And in this season he is more pugnacious, more ill-mannered toward human beings. Frequently, one finds, on the mountain side, a deep, wide hole from which huge stones have been dug. Somewhere among these boulders a marmot *had* its home.

Unquestionably, a grizzly realizes his strength and



A COLD CHILL RACES UP THE SPINE WHEN ONE MEETS A GRIZZLY

There is no doubt that these big fellows know their strength and power, are not readily frightened and, the Indians say, will never run from a foe

power. He is afraid of nothing unless it is a gun, and his slogan, according to the Indians, is "never run from a foe." Therefore you cannot readily frighten him, and whatever he may do depends on the mood he is in. But you can generally drive a black bear away, or out of your path—if it is not a female with cubs—by shouting and waving.

There is probably not one isolated cabin in the mountain wilds where some bear has not left a record of smashed window panes or claw-prints on the door. Bears, on their forages, often go in one way and out another. A broken window sash, found a quarter mile from a cabin, was mute evidence that a bear had worn it away as a necklace.

The brown "cinnamon," or rusty-colored bear is not a separate species but is merely the "blonde" offspring in a family of brunettes, and my old friend, Dan McCowan, an authority on wild animals, says the brown bear, in his experience, is not seen east of the Rockies. I have had at least two severe falls when my pony mistook a fire-blackened tree stump for a bear. This innate fear of the bear goes back to the time when he was both a carnivorous and aggressive individual, for, before the influx of the white man with a "stick" that emitted a flash of fire, a noise like thunder and a death-dealing bullet, the grizzly stole out on the prairie and attacked animals as large as a buffalo. When one's pony scents a bear, he is nervous and skittish, pulls on his reins, and will try to turn his head to see the side, or even back of him. He quiets down once he loses the scent. Every mountain man knows that bears, particularly grizzlies, will remain hidden from sight and yet follow along on a parallel course, curious to see who you are and where you are going.

Armed with nothing else than a camera, I have had an elk with a magnificent (and dangerous) spread of antlers face me but a few feet away, ready to charge should

I step out from the protection of a tree. I have faced a big bull moose on similar terms and once, on a narrow trail along a perpendicular cliff, I came face to face with a mountain lion. The lion was in a *cul de sac*. He could not retreat, nor could he leap up the cliff or off the trail without falling a thousand feet. I was the only one that could back away, and this was done slowly and with as much composure as possible. And yet, in none of these instances did I ever have that creepy sensation, the cold chill up one's spine, that comes when one faces a grizzly.

Some years ago at Emerald Lake there was a family of grizzlies—adults and cubs—who used to romp on a grass-covered knoll in plain view of the chalet. On the trail that leads over Burgess Pass to Field, a grizzly took his daily "constitutional". Coming along this trail one afternoon with a guide who wore a belt with a holstered pistol, I saw the bear some twenty yards ahead of us. It being my first experience with *Ursus horribilis*, I started to ride ahead to obtain a close camera shot when my guide seized my pony's reins. "See here," he whispered hoarsely, "it ain't safe to git any closer."

"But," I said, "you have a gun and can stop him if he comes at me."

"No I cain't," he answered, "I cain't stop that bear. Thar ain't nuthin' in the gun. You Eastern people likes to see us guides rigged cowboy fashion, so I just totes it along for looks. The game warden won't let me have any ketttridges."

Two years ago, in the company of a friend and an old Indian of the Stoney tribe, we met an angry grizzly who stood glaring at us, contesting our right of way. My Indian pony was only partly broken to the saddle, and we were on a sightseeing trip and not armed for big game. Also, we were in a narrow, rocky pass with no chance of detour. Before anything happened, however, the grizzly had a change of heart, and, with a series of short grunt-

AN AID TO THE CAMERAMAN

A can of syrup acts as a convenient lure and as a means to getting the bear to pose

ing growls, he lumbered up the side of the mountain where he stopped and again faced us.

One experience with a grizzly was before many of the present trails had been cut into the Alpine wilds of western Canada. During the first year of the World War my wife and I were in the van of a small cavalcade headed southwest from Banff with the intention of reaching Mt. Assiniboine, not an easy thing to do in those days. Our chief guide, Martin Lewis, was an excellent cowboy, but he did not know the route. "Muggins", his assistant, who was amazingly expert with the "diamond hitch" and in baking bannock, was even less informed.

After three hard-fought days in windstorms, snow, hail and rain, we descended the sun-kissed southern slope of the Great Divide and, with many a sigh of relief, went into camp below the 11,000-foot face of Mt. Assiniboine. Toward the end we had more or less followed the fresh tracks of a mammoth grizzly. These we could plainly see whenever the ground was damp and soggy. But when we unpacked and let our fagged-out ponies loose, we had forgotten big Mr. "Ouff-Ouff". I had our "A" tent set up a hundred yards or so from the guides' tepee and camp fire, on the slope of ground that dropped down toward a lake. The sun having disappeared in all its gorgeous splendor, I cut a quantity of balsam boughs for the tent flooring. As a precaution against some sharp-quilled porcupine who might take it into his head to sneak in and eat up our boots, I retained the axe.

It was well after midnight when I wakened to hear the ponies stampeding past the tent, squealing in the shrill high treble of fright. Although I was drowsy, the cause of their terror came to my mind. Shortly I heard the grizzly approach the tent, then stop, wheezing and puffing and emitting low growls. The guides in the tepee were too far away for me to hope that they would hear my call through their sleep. Our one rifle was still wrapped in a pony pack. So I felt for the axe although that seemed an inane thing to do in the pitch black darkness, and, reaching over, I tugged at my wife's arm until she was awake. "There's a grizzly outside," I whispered tensely. "Oh, is there?" she answered peevishly, and was again fast asleep. I did my best at watchful waiting, but it was useless. I slept the sleep born of complete fatigue.



An Englishman once told a story of his "hand-to-paw" encounter with a grizzly who crushed him into unconsciousness. "And when I awoke," he concluded, "I was dead and frightfully mangled." I awoke to find myself lying on my back but very much alive. The axe was still in my hand.

Up at the camp fire, "Muggins" was preparing breakfast as I emerged from the tent. "Good morning," he said, "Lewis has gone to git the ponies."

"I know," I nodded, "but there was a bear—" Falling into a freshly dug hole interrupted me. From that first hole there were excavations all around the guides' tent.

"That's what your grizzly done last night," said Muggins. "We must've set our tent a'top a hull village o' gophers an' that b'ar ate a big meal of 'em. Mebbe he'll come call on *you* ternight."

But that day we moved our tent close up to the camp fire, we nailed our food supply down under heavy canvas, and we divided the night hours into watches to keep the camp fire burning brightly.

It is curious how, in the mountain fastnesses of western Canada, daylight and the sun's brilliant rays disperse all thought of danger from wild animal life, and such lack of fear is proper, for you may be but one of a hundred who by accident comes face to face with a female black bear with cubs or a stubborn and strong-minded grizzly.

Since the time of Charles II, Britannia, with a trident in her hand and a shield at her side, has been seated proudly on the penny—a position that she continues to keep under George VI.



The accompanying photographs of coins are reproduced by courtesy of *The Numismatist*. The coins are enlarged in reproduction, the better to show their distinctive designs on them.

Britain's Money Goes Modern

By MAUD MACDONALD HUTCHESON

HAVING reached "legal age limit" on February 21, 1938, the familiar buffalo is to be removed from Uncle Sam's nickel and replaced by a more august figure—that of Thomas Jefferson. According to law, United States coins may not be altered in design oftener than once in twenty-five years, and since the buffalo ousted the Liberty Head in 1913 it is due for legitimate retirement this year.

Interestingly enough, the change in this popular piece of money—and by the way it has been "front page news"—follows upon a series of sweeping innovations put into effect by the other branch of the English-speaking peoples. The British—every member of the Empire Family—have broken boldly with tradition in the new King George VI coinage. However, instead of being removed from the more commonly-used coins, mammals, birds and



A new coin with the sea pink or thrift plant as decoration. This is twelve-sided

flowers are now making their début.

The average American does not need to be reminded that John Bull's money, like his weather, just has to be made the best of! Besides, grumbling over the difficulties of the sterling system can give place for a time to genuine interest in the new copper coins.

This modernizing of money was really begun by the Irish Free State, nearly a decade ago, when a "zoological series" was placed on the reverses of a new issue. The Irish hunter, the salmon, the bull, the hound, the hare, a hen with chicks, a pig with a litter, and a woodcock, comprised a *currency zoo* that aroused the keenest interest in numismatic circles.

With the accession of a new Sovereign to the crown of Britain's Empire new money must be minted, and while that does not mean the redesigning of every coin, "the occasion is an appropriate one

for reviewing designs generally". So explains Sir Robert Johnson, Deputy Master and Controller of the Royal Mint, in his recently-issued annual report—a document unique among government publications. Its otherwise weighty subject matter is set forth in a manner that fascinates, and in a delicately droll style that makes its reading a delight.

Of course, it has always been traditional for the coinage of the British Empire to carry the head of the Sovereign on the obverse side. It is the intricate heraldic emblems on the reverse that have been displaced on so many of the new coins.

During 1936, when the question of minting was up for discussion, Sir Robert Johnson was made aware that "some desire existed for a complete departure from heraldic tradition". "Simple pictorial designs" on the order of the zoological coinage of the Irish Free State could be "understand-



The wren, considered least of British Birds, appears on the smallest coin, the farthing

ed of the people", hence a dozen artists, including members of the modern school, were invited to submit new ideas and designs. The result was a surprising paucity of genuinely new ideas. Airplanes, steel works, mines, corn and cattle were suggested but ruled out, since Great Britain, it was felt, could not lay exclusive claim to such emblems.

There ensued much discussion pro and con between the moderns and the die-hards on the advisory committee, and at one stage it looked as if the latter were winning. One artist, however, taking the royal animals as basis, "produced a series of models which displayed both originality of thought and delicacy of craftsmanship". Of these the little wren won unanimous approval and now appears on the farthing. Since the wren is popularly credited with being the smallest of Britain's birds its place is appropriately on the



The Irish hunter has appeared on the silver half crown of Ireland, and the bull on the shilling for about ten years



farthing, a coin of the size and value of half an American cent. In addition, the wren has ancient and mythical claims to "royalty" in the bird world, where its respectability is likewise said to be a by-word.

A romantic change has been bestowed on the coin of next lowest value. The George VI half-penny (equal to a United States cent) proudly displays the *Golden Hind*, in which gallant Sir Francis Drake adventured over uncharted seas and named a new world Virginia in compliment to Elizabeth, the imperious Virgin Queen.

Britain's legitimate pride in her shipping has a good deal to do with the appearance of this brave little ship on the ha'penny. It's a far cry from the *Golden Hind*, with sails furled, to the latest Clyde-built marvel, but as the Deputy Master of His Majesty's Mint takes occasion to point out, "even the lay mind can see that there's no room for the *Queen Mary* on a penny"!

Now, the penny, equal to two American cents, is the most unwieldy of all John Bull's coins. It is the heaviest copper coin in circulation in Europe, and, although steadily losing favor because of its bulk and weight, it cannot, like its cousin, the buffalo nickel, be gracefully "retired". The chief reasons are that to recoin some 2,000,000,000 pennies would keep the Royal Mint occupied for a whole decade, and that the automatic vending machine system would be thrown almost out of gear. Pennies have a wide purchasing power in the British Isles, including tram rides.

Since the time of Charles II, Britannia, with a trident in her hand and a shield at her side, has been seated proudly on the penny—a position she continues to keep under George VI. Around the middle of Victoria's reign some daring innovator introduced a tiny lighthouse. The change upset the conservatives so much that the offending property was taken off the next issue, but now the lighthouse re-appears in the background.

With the copper coins disposed of, next to be considered was the lowest silver piece, or three-penny "bit". Of exasperating smallness, it has done yeoman service for three cumbersome pennies since 1845.

Statistics show that this coin is regarded with genuine affection in thrifty Scotland, also in Australia and New Zealand—doubtless since so many Scots have migrated to the Antipodes—but English people in general and Londoners in particular have a decided grudge against it. This, thinks the



A fishing schooner sails across the reverse of the Canadian dime



The caribou is appropriate on the reverse side of the Canadian quarter



Important in Canada's physical history, the beaver is on the nickel



Sir Francis Drake's *Golden Hind* wins recognition on Britain's ha'penny



Two sparrows on South Africa's farthing, and, below, the royal Scottish crest on a shilling



Deputy Master of the Mint, is due to the elusiveness of the tiny piece among other coins in purses, and its proneness to slip out of pockets that have acquired small holes. Anyway, when the new coinage question was up there was hot debate over a more convenient piece to substitute for three pennies.

It had to be readily distinguished both as to size and color from the many other silver and copper members of John Bull's confusing coin family—something that could "be picked out of pocket or purse easily", and that "not even a strayed reveller in the dark" would mistake for, say, sixpence!

The result is a real triumph for the liberals—a 12-sided coin of nickel-brass—its bright yellow color and odd shape setting it undeniably apart, and it is of a thickness to avoid any surreptitious use in slot machines made for sixpences.

The reverse design is a flower—three heads of the sea-pink or thrift plant that grows in tufts along sandy stretches of sea-coast. It is the work of a woman, Miss Madge Kitchener.

Acknowledged as "the most novel feature of the new coinage", this shockingly modern nickel has resulted in "some bad language on the part of the die-hards", yet it has had a remarkably good press. Its peculiar shape, thickness, color and design, however, have made it anathema to the Scottish banks who have classed it a horror and so far won't handle it.

Scotland has been specially complimented anyway, for King George has honored his Queen in a new shilling bearing the Royal Crest for Scotland on the reverse.

Of course, it must not be supposed that conservatism has been entirely overthrown. Britain's silver coins still keep their ancient heraldic forms.

A fact of interest, too, is that, owing to the abdication of King Edward VIII, more than 200 dies for coins, medals and seals were rendered useless.

That this new pictorial policy for coins of the realm is not confined to the British Isles will readily be seen by a glance at the 1937 issues of the various Dominions and overseas possessions.

Canada, oldest of the nations within the British Commonwealth, has adorned the reverse side of her George VI 25-cent piece with a caribou head of noble proportions, while the industrious beaver, claimed as the Dominion's animal-emblem, appears on the

nickel. A fishing schooner sails across the dime, and the silver dollar, on which there is considerable room for experiment, portrays a voyageur and an Indian manning a canoe, with an islet for background.

Australia has chosen a merino or ram's head for her shilling, and three ears of wheat for the threepenny bit—designs appropriate in that continent of vast sheep and wheat farms.

South Africa, which has also gone in for boats and birds, has brought Biblical tradition up to date by placing two sparrows on the farthing.

Included in this question of British coin modernization was the proposal to change the Latin inscription surround-

ing the King's head into ordinary everyday English. Latin, like heraldry, is "not understood of the people", but although it is becoming an always "deader" language, it has one marked point in its favor—its contractability.

King George's full title shares the difficulty of the *Queen Mary*. It is too majestic for use on a piece of normal-sized money. For instance,

"George VI, by the Grace of God, of Great Britain, Ireland and the British Dominions beyond the Seas, King, Defender of the Faith, Emperor of India", is written cryptically round His Majesty's head, as simply "GEORGIUS VI, D.G. BR: OMN: REX: F.D. IND. IMP".

Wading in the Pool

By MARGARET TYNES FAIRLEY

Cool, cool,
Wading in the pool
Where the water widens out,
Opal ring and ring about.
Gold light falling in a shower,
Shadows opening like a flower
'Til the petal crisps and curls,
At the heart a strangeness whirls.
Then it seems some mocking ghoul
Grins and grins from out the pool;

Tilts the sky and plaits the trees,
Bends like weeds the mirrored knees.
Widening, widening all the while,
Grin on grin of goblin guile,
Out and out and out and out,
'Til the shores are looped about,
Rocking with a muffled laughter,
Ring on ring of motion after,
'Til the wheels of goblin mirth
Circle round the dizzy earth.

The Coffee Tree

By WILLIAM M. HARLOW

THE scientific name, *Gymnocladus*, of the coffee tree, means literally "naked branches". Of course, the branches of all deciduous-leaved trees are bare during the winter months, but those of the coffee tree seem especially so, perhaps because of their large size and grotesque appearance as viewed against the winter sky. Then, too, they are often tardy in their spring leafing.

During the period of a few days or a week in the fall, it is possible to obtain some unusual pictorial effects due to the manner in which the leaves are shed. In the first place these are huge—two to three feet long as a maximum—and twice compound, that is, with a branched leaf stem. The leaflets are shed first, leaving the framework or skeleton attached to the branches. At this time, the limbs seem to be interspersed with coarse spider-web structures, which, within a few days, separate and fall to the ground.

There are two species. One, a native of eastern Asia, is little known in America, but our species, *Gymnocladus dioica*, the Kentucky coffee tree, is found from southern New York southward to Tennessee, mainly west of the Alleghenies, and westward to Minnesota and Oklahoma.



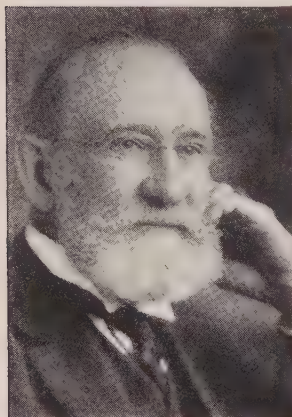
Men Who Have Given Their Names

*Biological Survey scientists prominent in
scientific naming*

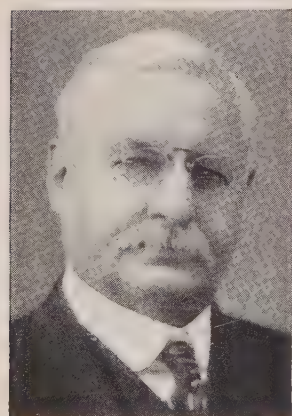
By DON BLOCH



C. HART MERRIAM
In 1916



HENRY W. HENSHAW
About 1915



EDWARD W. NELSON
In 1920



THEODORE S. PALMER
In 1933

RUNNING around loose and carefree, down in the Rogue River Valley, Oregon, is a tribe of dark-buff kangaroo rats. All unaware they are that, for the sake of science, their clan is named *Dipodomys heermanni gabrielsoni*; and it is doubtful whether the fact would alter the manner of living of its members if they did know it.

Just which party in the christening is here flattered is a moot point: whether the rat, because it bears the patronymic of Ira N. Gabrielson, chief of the Biological Survey; or the chief, himself, in being chosen nominal godfather to an interesting, if obscure, race of rodents.

Still—this way lies immortality. And many members of the Bureau, besides Gabrielson, have achieved the honor of having their names recorded in perpetuity through association with the creatures of earth, air, and water. Kangaroo rats, in fact, with slight variations, have done further duty in immortalizing the names of at least five other Survey investigators: the late Edward W. Nelson, once Survey chief, and author of three studies in the world-famous North American Fauna series issued by the Bureau; Vernon Bailey, formerly chief field naturalist and author of seven numbers of the series; C. Hart Merriam, first chief of the Survey and author of thirteen of the Faunas; Edward A. Preble, former Bureau biologist and now associate editor of *NATURE MAGAZINE*, who has authorship of four volumes in the Fauna series to his credit; and Clark P. Streater, a well known field naturalist.

There are two ways, however, by which a person may attain this immortality in nomenclature: by someone naming a new genus, species, or subspecies after him; or by himself describing some genus, species, or subspecies new to science.

Among these giants of taxonomy in the Bureau—those whose work in characterizing mammals, birds, and other organisms so that they may be properly listed in scientific categories has assured their names an everlasting fame—are Merriam; Harry C. Oberholser, senior biologist and consulting ornithologist; Alexander Wetmore, ex-biologist of the Bureau, and now assistant secretary of the Smithsonian Institution, in charge of the U. S. National Museum; Edward A. Goldman, senior biologist, author of three North American Faunas, and currently engaged in the writing of two more; Hartley H. T. Jackson, senior biologist, in charge of the Section of Wildlife Surveys, and author of two volumes in the series; and Waldo L. McAtee, technical adviser and research specialist of the Bureau, author and co-author of numerous Bureau publications, including one in the Fauna series.

Collectively, these six Bureau members have described and named, and often themselves have been the ones who worked in the field and collected, more than 2000 new and then unrecognized living types of vertebrates and invertebrates—often belonging to genera or subgenera, or even families or subfamilies, theretofore unnamed.

Then there is Wilfred H. Osgood, member of the Survey long enough to write six numbers of the Fauna series, and then, or since, author of several genera and upwards of two hundred species of mammals, and a few birds. The first group included a genus of muskoxen that inhabited western America many thousands of years before Columbus even met Isabella, and a whole flock, or town, of pocket

mice, rabbits, flying squirrels and other small game from various parts of North America. Later he named many species of rodents and other mammals from South America and from Abyssinia, as well as nearly a dozen miscellaneous genera and subgenera from various nooks and corners of the world. There are also a variety of strange mammals, mostly rodents, from far places, described by others, that bear the name *osgoodi*.

Oberholser alone, in some 750 papers published over a period of forty years, has described 648 bird forms. In a series of some 60 papers, McAtee has been author or joint author in describing 19 genera, 24 subgenera, 465 species, and 129 subspecies or varieties of insects new to science. Goldman is noted in this group as field collector and systematist; Jackson as a recognized authority on the mammals of North America; Wetmore for his work in comparative osteology and with fossil forms; McAtee for his work with insects; and it is almost a legend within the Bureau that Merriam, in his voluminous writings, has "named more animals than Adam!"

From 1758, the date generally accepted as the one marking Carl von Linne's revolutionary work on nomenclature, the "binomial system" has been used in giving animals scientific names that indicate their classification. Animals already had received such differing common or popular names, given them without regard to any rules by the people who lived in the same regions with them, that the taxonomists were forced to devise and bestow technical names according to a definite system following accepted rules. Besides being grouped in a certain class, order, family, and sometimes suborder, superfamily, or subfamily, each living form has a generic, a specific, and perhaps a subspecific name that may not be used for any other forms within certain broad or narrow groups.

Each species was once considered a distinct and unvarying creation, but scientists now know that members of the same species may differ in size or color, or both, if they come from different parts of the region that the species inhabits. Such variations are geographic or racial, and thus subspecific, and scientists designate the forms showing them as subspecies. If a taxonomist describes a form as a subspecies, he uses a third name for it, thus making a trinomial of the former binomial; and the fact that a form of life has three names shows that it is one of a number of intergrading geographic or racial representatives of a given species. Criteria for subspecies vary, and consequently taxonomists often have widely differing ideas about distinguishing characters.

This trinomial, or third name, accounts for the "*gabrielsoni*" in the case of the little kangaroo rat of Oregon. Often, it is either the name of the collector of the specimen, or of the locality, changed terminally, to form the subspecific name in its Latin form. It used to be a favorite stunt among taxonomists, when some new form of external parasite was described, to name it after the friend who had collected the type specimen. After a while, however, when this practice had begun to scare off these friendly field collaborators, it gradually died out. It didn't die out quite soon enough, however, to exclude the name of Wetmore, which is tacked on to one of the biggest fleas known to science, captured in the District of Columbia.

But a veritable parliament of birds and whole congresses of animals might well assemble from the ends of the earth, whose binomials and trinomials are the surnames-plus-"i" of members of the Biological Survey. And answering the roll call would be a mountain quail and a Hawaiian rail to whistle "*palmeri*", named after Theodore S. Palmer, long assistant chief of the Survey; and a mountain lion to scream and a wolf to howl their "*youngi*", after Stanley P. Young, chief of the Bureau's predatory animal control. Unfortunately, however, *Felis youngi* has been used already for an ancient cat from China, fossilized since the Pliocene. So it seemed for a time as if Young was doubtfully honored. However, Goldman has lately made good by renaming this particular puma *Felis stanleyana*. *Canis youngi*, a wolf, however, seems so far to be safe from the suspicion of synonymy. And the smallest known pocket mouse could squeak "*piperi*", and with impunity—for Stanley E. Piper, former associate biologist—and Piper one of the tallest men the Bureau ever had.



ALEXANDER WETMORE
In 1936



WALDO L. McATEE
In 1931



EDWARD A. GOLDMAN
In 1937



FREDERICK C. LINCOLN
In 1937



ARTHUR H. HOWELL
About 1928



HARTLEY H. T. JACKSON
In 1937



HARRY C. OBERHOLSER
In 1935



WILFRED H. OSGOOD
In 1929

A hummingbird would answer for Henry W. Henshaw, the Survey's second chief; a bee would buzz in and a pocket gopher crawl from Utah, bearing the names of James S. Silver, regional director, and Clarence Birdseye, former field naturalist, respectively. For J. Alden Loring, Merritt Cary, A. K. Fisher, Stanley G. Jewett, Olaus J. Murie, Ned Hollister, Theo. H. Scheffer, Walter P. Taylor, Jackson and Streater—all biologists and field naturalists currently with, or once members of, the Bureau, and authors—Murie of one, and Cary and Hollister of two each—of the Fauna volumes—would come creeping and crawling shrews, weasels, tree squirrels, wood rats, cotton rats, white-footed mice, pikas, lemmings, meadow mice, deer mice, moles, chipmunks, pocket gophers, pocket mice, and red-backed mice!

A little green lizard would scurry across the desert to answer "*lincolni*" for Frederick C. Lincoln, senior biologist. What sound the tiny five-ringed snail, likewise named for Lincoln, or the angworm named for F. E. Garlough, in charge of the Bureau's Control Methods Research Laboratory in Denver, might make in this assembled chorus, is a matter of conjecture.

To make up the quorum, too, would answer the lemming mouse, woodchuck, otter, and shrew tribes named after Preble. This shrew, *Sorex preblei*, incidentally, was named after him by Jackson; but, to add a bit of interest here, another shrew, *Microsorex hoyi winnemana*, found up the Potomac from Washington, D. C., by Preble, and described by him, is the smallest known North American mammal. The name "*winnemana*", meaning "beautiful island" in the language of Indians once inhabiting the region, refers to the nearby home of the Washington Biologists' Field Club. Recent research by Jackson has revealed that, with the possible exception of certain shrews inhabiting Italy and Madagascar, this one of Virginia is the smallest mammal in the world, with a body length under two inches and a weight of less than three grams!

Some background for the quorum of the christened may not be amiss. When he died in 1934, Nelson left his name perpetuated, not only by animals named after him, but also in a vast body of zoological writings and in geographical nomenclature. For example, there is a range of mountains in California bearing his name, a lagoon in Alaska, and an island at the mouth of the Yukon; and there is a genus of plants named for him. The names Preble Bay, in Great Bear Lake, and Preble Island, in Great Slave Lake, commemorate Preble's contribution to geography in connection with his famous biological survey of the Athabaska-Mackenzie Region of Canada—the results of which are published in his 574-page North American Fauna No. 27. For McAtee and Wetmore, are named cactuses; and for Goldman, two genera of plants, *Goldmania* and *Goldmanella*.

But now we come to those members of the Bureau whose friends and fellow scientists have named whole arkfuls of birds and mammals for them. Through the years there have accumulated to these following investigators real private zoos—of which, let it be known, each is justly proud.

For Nelson, there have been named a skunk—"Just so it is a *good* skunk," said Nelson, when the taxonomist asked permission to name this fellow after him—a paca (large South American rodent), a ground squirrel, a shrew, a lemming—of that family of curious sporadic migrators that periodically march in vast numbers toward the open sea, to commit inevitable suicide—an opossum, two pocket gophers, a pocket mouse, coati (a raccoon-like animal), a genus of wood rats, deer, rice rat, mountain sheep, harvest mouse, rabbit, tree squirrel, bear, white-footed mouse, shrike, a woodpecker, and a bat—one of the largest in America. All together—this is only a partial list—Nelson had named for him more than 100 species and subspecies of mammals, birds, and plants.

Merriam's "zoo" of mammals carrying his name contains the following (one each): pocket gopher, chipmunk, rabbit, pocket mouse, white-footed mouse, bat, harvest mouse, shrew, and bear. Arthur H. Howell, senior biologist, and author of eight volumes in the Fauna series, has an odd pair: a mole and a nighthawk! And Bailey's zoo contains bobcat, rabbit, bat, wood rat, deer, pocket mouse, pocket gopher, cotton rat, and squirrel.

For Oberholser to keep an eye on are a genus of towhees, a species of Philippine

bullfinch, a Salvadorean vireo, a thrasher, an East Indian edible-nest swiftlet, two beautiful tropic birds from Central America and the East Indies, and, in the sea, a microscopic univalve shellfish called a cerion. For McAtee there are a genus and six species of flies, an equal representation of true bugs, and a species of thrips.

For Wetmore, long-legged naturalist in person, has been named a genus of long-legged fossil birds; and also genera of sponges, true bugs, long-nosed fishes, and lizards. Among species and subspecies named after Wetmore on the list of cards in his office files—labeled, in large letters, *Private Zoo*—are an Argentinian rat mite, another true bug, a mouse, a crane fly, and a thrips—the latter, in its method of getting about, at least, a sort of Lilliputian comedian of the insect world—two odd land shells from an island off the coast of the Dominican Republic, a frog, a snake, three lizards—"very handsome", as characterized by Wetmore—a fossil stork, a Puerto Rican bat, and five birds—a pigeon, a honey-eater, an owl, and two tanagers.

But the real Noah of the current Bureau crew must be Goldman. For, in this case, in his forty years of scouting about as a naturalist there have been gathered to him an amazing collection of birds and beasts bearing his surname. In his zoo are a rattlesnake, a coyote, two pocket gophers, a turtle, shrew, jaguar, flying squirrel, two pocket mice, a rabbit, ground squirrel, cotton rat, weasel, two wood rats, a rice rat, tree squirrel, white-footed mouse, harvest mouse, and a toad. There are also a genus of wood rats and one of hummingbirds; a subspecies of trogon (a flamboyant tropical bird); and a species each of song sparrow, yellowthroat, warbler, whippoorwill, shrike-vireo, nunbird and mot-mot.

Just a word or two about this mot-mot. Here is the true dandy among birds. It is from Mexico, and it is perhaps the only bird in the world that, not satisfied with the way Nature has fashioned it, mutilates itself for purposes of decoration. When full grown, the male, probably as a sex or mating gesture, tears and plucks out with his beak a portion of the fine barbules along the two longest shafts of his tail. When he has completed the job, there remain a pair of paddle or racket-shaped doo-dads to flutter and flourish in the face of his chosen mate—an act in the rites of courtship of all good mot-mots since the beginning of their time.

And what is the process of naming genera and species? Just how does one know that a certain specimen needs to be given a new name, either generic or specific? In general one may say it is the study and comparison of specimens, often induced by some previous knowledge. Of course there are cases where the specimen is so striking in its colors that its novelty is immediately apparent. But in most instances the best characters may be peculiarities of the skull or the teeth, or even involve some deeply concealed structural detail. Certain particulars may be of interest.

Some years ago—forty to be exact—a young naturalist, whose portrait (of a later pattern) appears on this page, took a specimen, skin and skull, to his chief, and pointed out that its teeth showed certain peculiarities. Not long afterwards, on December 17, 1897, there appeared in the proceedings of a local society the technical description of this specimen, preceded by this remark: "Recently, on looking at the skull of a large white-footed mouse from the mountains of Zacatecas, supposed to be a typical *Peromyscus*, I was startled to find that it had the flat-topped prismatic teeth of a wood rat, *Neotoma*." The author then proceeded to describe, in scientific language, the new genus *Nelsonia*, after Edward W. Nelson, and the species *neotomadon*, after the aforesaid teeth.

A few years later there appeared in the voluminous collections that continued to come from Mexico a second specimen of this rare genus, and a careful study justified the dedication of this novel creature to Goldman. By this coup Merriam further honored his old friend Nelson, and at the same time Nelson's field partner Goldman, whose youthful agility and perseverance had added so materially to the joint collection that for many years carried their names on each label.

Such nomenclatorial gestures have sometimes raised the suspicion that an increased activity in field work might be expected, but it is believed that in this case the ultimate possible degree of efficiency had already been achieved. Old timers conversant with the history of the field partnership of these inseparable friends and indefatigable collectors will need no further comments.



IRA N. GABRIELSON
In 1935



ALBERT K. FISHER
In 1924



EDWARD A. PREBLE
In 1927



VERNON BAILEY
In 1933

THE NYA AND CONSERVATION

Iowa project shows the way to other groups

By HORACE L. POOLE

THE National Youth Administration has pledged itself to cooperate in the fight to save endangered resources of soil, water, forest, minerals and wildlife. The wise and diversified use of these national natural resources, and their conservation in rural areas, offer a great field of opportunity as well as material and cultural advancement for youth. In this work programs must be developed that will not only assist in actual physical accomplishment, but will also inform as to the need for continuing and extending conservation programs.

Conservation projects of the NYA are now operating in many states. They vary in character and with the locality and its needs. An example of what can be done is found in the project at Dubuque, Iowa, a program more or less unique in its completeness of scope.

As supervisor of a NYA group, I met with the State conservation officer for northeastern Iowa, R. W. Barsalou, and worked out with him a county-wide plan of cooperation. As a sort of aside, it might be well to explain that the NYA is similar to the WPA but is exclusively for young people between the ages of eighteen and twenty-five. It is meant to supply part-time work and additional income to larger families on relief rolls. NYA work projects must be of educational value to participants as well as of value to a community.

The application for the proposed conservation and game management project was accepted by Administration officials, and work was started on the new project in mid-August 1936. Twelve young men were assigned immediately. An empty building was loaned to serve as a headquarters and workshop. Local factories and merchants donated shipping boxes, crates and gunny sacks. Empty nail kegs were turned over by factories, lumber yards, hardware dealers, and by WPA construction projects, and we were soon turning out feeding stations for song birds.

The nail kegs were notched and provided with a base for use as food hoppers in game bird feeding stations. The gunny sacks were used for collecting and storing food.

It was not long before two hundred game bird stations had been established, the greater part of which were lean-to type shelters with nail-keg food hoppers placed in them. Song bird stations were placed in the public parks, at every public and parochial school in the cities and towns, and at many of the rural schools. Many of these were cared for by the school children, and the rest were tended by project workers during the winter.

We distributed more than thirteen thousand pounds of food, entirely through feeding stations. This food was collected by members of our group, solicited by the writer from dealers, bought by sportsmen, donated by farmers, or collected by the Boy Scouts. The food consisted of shelled corn, cracked corn, cane tops, broom corn tops, oats, wheat, ground acorns, sumac seed, wild hemp, and mill sweepings.

Grit was included in the form of granulated limestone. Bread crumbs were used to some extent in the song bird mixture until extremely cold weather came on.

In a number of instances farmers or neighbors, in the vicinity of a station that was far from the beaten path, took care of the stations. Following are excerpts of a report from such a source:

"... Great concentration of bird and animal life around shelter. . . . Only one bluejay seen all winter . . . numerous cardinals, juncos, chickadees, four species of woodpeckers, flock of lapland longspurs, rabbits, squirrel, opossum, etc. . . . Six to thirty-two quail observed at station daily. . . . Rarer birds seen were an unusual flight of sea gulls, several tree sparrows, brown creepers, starlings, and a single pileated woodpecker. To protect this station one horned owl, two gray foxes, one civet cat, one opossum, one crow, two house cats and four dogs were



FOUR HUNDRED FEEDING STATIONS WERE BUILT

These were placed in parks, and at schools in cities, towns and in rural districts

trapped. The opossum and all the dogs were released without injury. All these animals were trapped in the night time and this shows how little regulation of farm cats and dogs exists. The shelter is not within a half-mile of any house and these cats and dogs were presumed to be guarding the hen coop or destroying mice."

Feeding station reports were also made out by the workers for each visit to a station. They show the date, number of the station, location, time, weather, condition of the ground (dry, wet, or snow), condition of feeder (half-full or empty), amount of food placed, birds and mammals observed, tracks or droppings observed, and general remarks.

Fall work also included establishment of six wildlife nesting and producing areas for game and song birds, as well as for rabbits and squirrels. Two four-acre areas were turned over by the county for use by the project, a one- and a five-acre patch by farmers, and a three- and a ten-acre area by the Trappist Monastery located twelve miles from Dubuque. Some fencing material was furnished by the NYA and the remainder by those furnishing the land. Several hundred rods of new fencing were built by project workers. These areas were fenced to prevent grazing and molesting and were posted with signs made by the workers. The vegetation on these areas is being controlled to suit the needs of the wildlife found there. Development work and fall plantings were made in these areas.

Winter work, besides the feeding, included collecting some 80,000 willow and wild grape cuttings for spring planting. Four hundred bird houses were also built for the public parks and for the urban and rural school grounds. These were placed in the early spring.

Spring planting consisted of 100,000 young trees and vines. Fifty definite feed lots of corn and cane were planted where they would be of benefit to birds during the coming winter. They ranged from four hundred square feet to an acre in area. The larger ones helped furnish much of the food for this past winter.

Part of the summer was taken up in establishing two additional nesting and producing areas, one four and the other twenty-three acres. State Game Refuge signs and Game Management Area signs were posted by the youths. In one case, thirty-three miles of fencing were posted. A NYA tree nursery was prepared and now contains approximately 6000 seedlings to be transplanted later.

More than a quarter of a million fishes were rescued by project workers from ponds and sloughs that had been flooded in the spring and were about to dry up. Varieties of fish rescued included black bass, crappie, sunfish, catfish, bullhead, pickerel, wall-eyed pike, sucker, perch, quillback, gizzard shad, red-horse, and shiners. Rough and predatory fish such as gar-pike, dogfish and carp were



A FEEDING STATION FOR GAME BIRDS

Many such nail-keg food hoppers have been established, to which 13,000 pounds of feed were distributed

destroyed. All other fish were transported by pail to adequate waters upon being rescued.

Miscellaneous work of many sorts was done. Included was the preparation of a thirty-six-page booklet relative to conservation and the project's work. Several mimeographed leaflets were prepared, such as check-lists of birds, trees, and shrubs, instructions for building bird houses. A series of weekly releases on conservation was furnished to fifteen newspapers. Many forms were made, such as bulletins, questionnaires for school teachers, and individual feeding station reports. Much of the mimeographing and stenographic work was done by girl NYA workers assigned to that activity.

One interesting piece of work was the cooperating with Mr. Barsalou in establishing a beaver colony that now numbers five animals. The den was built and a dam started to raise the stream level at the mouth of the den. The beavers were furnished by the State and were released in the den. The local newspaper played up the beaver experiment in a number of articles. One beaver was originally placed, and soon two more were added. That made one female and two males. The newspaper headlines were something like this: "*Beaver Colony Has Own Eternal Triangle*". Later the larger male strayed from the colony and was found appropriating a dog house, apparently having ousted the young dog. The newspaper played that up with: "*Bachelor Beaver Now In the Doghouse*". Sometime later another pair were added and the paper increased the "*triangle*" to a "*pentagon*". The unusual publicity succeeded in giving the project much additional public support.

More than 50,000 additional plantings were made during the fall of 1937 on wasteland areas as well as in the already established refuges. Seed was collected for planting this spring as well as food for the coming winter.

We also were privileged to work with Thomas G. Scott, wildlife specialist for the State, for one month, on a survey of mammals, particularly rodents. Mr. Scott made his headquarters at the NYA workshop and instructed

us in preparing museum specimens, dissection, skinning, and preserving of skins.

More than seventy interested firms, societies, and individuals have contributed supplies or materials, or some service that has helped in no small way to make this work possible. A gift of \$50 assured the project of heat in their headquarters last winter, and provided seed and trees.

The work outlined in this article has been accomplished with an average of from twelve to fifteen youths. Since their time is limited to eleven hours per week they work

but about two days per week. Their time is staggered so five or six work each day. To put it in another way, this work has been done with the equivalent of five or six full-time workers and the full time of the writer, not to mention the help and cooperation of the conservation officer sponsoring the work. We understand that eight projects of this sort are being organized in this State. We hope that there will be more, and that this article may be the stimulus for work of somewhat similar nature in many localities, be it NYA, WPA, Boy Scouts, or others.

The Magic Moth

By EDITH M. LAING

IN 1930 a Silk Producers' Congress was held in Beyrouth, the capital of Lebanon. In honor of it, a special postage stamp was issued with appropriate design picturing a mulberry leaf, silkworm, cocoon and moth. The inscriptions on the stamp, in Arabic and French, reflect part of Lebanon's political history. Prior to the World War this ancient Phoenician country had long been part of Turkey's Syrian province. After the war, it was placed under French mandate, but has since become a republic, although still under French protection.

The story of silk, and of *Bombyx mori*, the silkworm, is one of the most romantic in history and Nature. Of all varied school projects not one is more fascinating than that of sericulture. How eagerly the children bring the daily fresh supply of mulberry leaves to satisfy the voracious appetites of the tiny larvae until they grow into fat, creamy caterpillars! With what wonder they watch the spinning of the cocoons as each caterpillar diligently wraps itself for the pupa stage! Pure magic goes on inside the silken cocoons that are left undisturbed, for in twelve days or so, small, ashy-colored moths emerge and make ready to lay their eggs, which commence the life cycle all over again. But what of the other cocoons? After treatment by heat to destroy the pupa within, these are revealed as the source of the lustrous fabric we know as silk. What can match the glow experienced by the fortunate child who becomes the proud possessor of a pale golden wad of the shining filament unwound from one of these magic cocoons?

As far as is known, sericulture originated in China at least 3000 years before Christ. So honored was the art, and so jealously guarded were its secrets, that the raising of the wonderful caterpillar and the weaving of the luxurious product were the treasured prerogatives of royalty alone. It is claimed that the Empress Si-ling invented the loom.

There are several traditions as to how the secrets of silk manufacture penetrated to other countries. The best known is of the two Persian monks who spent years in

China as missionaries, at the same time keeping both ears and eyes wide open. The result of their astuteness was such that when they returned home they were able to present to their Emperor "silk seeds"—eggs of the silkworm—that they had successfully concealed in walking canes used on their long trek across Asia. It is said that from this source sprang all the subsequent European stock.

The rare and costly silk merchandise of the early Romans was obtained from Constantinople, India, and Persia. Gradually the industry spread to France, which became famous for its silk weaving. From there, Flemish weavers, fleeing the religious persecutions, carried the industry to England.

In 1605 James II of England planted groves of mulberry trees around his palace, and offered seeds to anyone who would sow them and raise trees for silkworms. The anticipated riches from a national silk industry did not materialize but, thanks to the initial enthusiasm, many famous old English gardens still are graced with handsome specimens of mulberry.

The same zealous monarch did his best to induce the Virginian colonists to engage in sericulture, and gnarled, ancient mulberries still grow in restored Williamsburg. However, in spite of bounties offered, and even dire penalties threatened, the Virginians saw more possibilities in tobacco.

The mulberry was planted in Georgia by Oglethorpe. Caterpillars were raised, and a quantity of the first spun silk sent as a present to Queen Caroline of England. A gorgeous coronation robe for Charles II was woven from Georgia silk.

This country buys most of its raw silk from the Japanese, who learned the secrets of sericulture in the second century A. D. They imported Chinese girls to teach the process. Today millions of Japanese peasants are dependent on the raising of the silkworms and the mulberry leaves required to feed them. Numerous attempts to develop sericulture in this country have failed, principally because it is impossible to compete with the cheapness of Oriental labor.



Retracing Muir's Steps

*Centennial of naturalist's
birth calls forth a tribute*

By JOSEPH S. DIXON

*Field Naturalist, National Park Service
Photographs that follow by the Author*

ON APRIL 21, 1838, at Dunbar, Scotland, there was born to Daniel and Ann Muir their third child and oldest son, John, who was destined to become, through the years, one of the most inspiring and best loved naturalists in all America. Regarding his Scotch ancestry, John Muir once wrote a friend, "for there is heather in me, and tinctures of bog juices, that send me to *Cassiope*, and, oozing through all my veins, impel me . . . through endless glacier meadows, seemingly the deeper and darker the better."

John's father was an intensely industrious and devout man. He was a literalist who apparently did not realize that "facts of Nature are likewise part of the manuscript of God", and insisted that his son learn a prescribed number of Bible verses daily under pain of the rod. By the time John was eleven he states that he could recite, "by heart and by sore flesh", three-fourths of the Old Testament. This doubtless explains his familiarity with and apt quotation of the Bible, and perhaps was the foundation for many of his "perfect" literary expressions.

John Muir probably inherited his unusual love and understanding of Nature from his mother. Her letters to him show that she shared his esthetic appreciation of Nature. The poetic strain in her was shown by her going each April to the Wisconsin woods to gather a few of John's favorite spring flowers, which she sent to him with her birthday greeting. Muir described her as "pious, affectionate, fond of painting and poetry."

Coming to America in 1849, John Muir helped to establish the family home in Wisconsin, and entered the University of Wisconsin in 1860. Working his way through the University, he lived at times on as little as fifty cents a week for food. After nearly losing his sight in a factory accident, Muir "determined to store his mind with the Lord's beauty and thus be ready for any fate, light or dark." A thousand-mile walk to the Gulf took him to Florida, whence he sailed, via Panama, and reached San Francisco by the Golden Gate on March 27, 1868.

Accompanied by an English friend, Mr. Chilwell, the naturalist set out afoot for Yosemite, going by way of Oakland, San Jose, Pacheco Pass and Snelling to Coulterville,

which was at that time the last outpost. There they bought tea and a few pounds of flour for their trip into Yosemite afoot. When Muir first saw Bridal Veil Fall from a distance he estimated its height to be fifteen or twenty feet! It took many days' investigation of the famous valley before he was able to grasp its true magnitude. Continuing his trip afoot, he visited the Mariposa grove of sequoias near Wawona, after which he returned to Snelling for the winter. Muir reports that their month's trip to Yosemite cost "about three dollars per man" for the entire trip!

Muir next visited Mount Hoffman, Tenaya Lake, Tuolumne Meadows and Mono Craters, and spent the winter of 1869 in Yosemite Valley. There he remained and worked for a Mr. Hutchings for two years in order to study the origin of this wonderful valley, which certain prominent geologists of that day claimed had been caused by a geologic fault that had resulted in a gigantic crack or displacement of the earth's surface dropping down and forming Yosemite Valley. From John Muir's study of the ancient glaciers of the Yosemite region was developed the modern conception of the part that glaciers and stream erosion have played in the origin of Yosemite Valley. Repeated years of investigation tend to strengthen and to prove the correctness of his views.

I have had the pleasure, during the past thirty years, of retracing hundreds of miles of Muir's footsteps in Yosemite and Sequoia National Parks and in the foothills of the Sierra Nevada. In a similar manner I have followed his trails in British Columbia, and at Glacier Bay and through other parts of Alaska. Unlike most other mountaineers, Muir could write: "I have never left my name on any mountain, rock, or tree in any wilderness I have explored or passed through, though I have spent ten years in the Sierra alone." However, the accurately detailed descriptions made by him leave no doubt as to the exact places he visited, and there is no need for physical records. To me the most marvelous feature of Muir's work is that he combined scientific accuracy with esthetic appreciation and the ability to present colorful word paintings of Nature, a rare combination of talents to be found in any one man. American is indeed fortunate in this gift from Scotland.



*"Braving in Silence the Storms
of Perhaps a Dozen Centuries."*



*“How Cheerily It Sings the Songs
of the Wilderness, and How
Sweet Its Tones.”*



*"Nature's Poems Carved on Tables of
Stone—the Simplest and Most Emphatic
of Her Glacial Compositions."*



*"Some Venerable Patriarch May
Often be Seen, Heavily Storm-
marked, Towering in Severe Maj-
esty above the Rising Generation."*

The Seahorse — Composite Denizen of the Deep

PERHAPS in no other animal have been packed so many anomalies as in *Hippocampus*, popularly known as the "seahorse," a systematic study of which recently has been completed by the Bureau of Fisheries. This queer personality has the head of a Lilliputian horse, a prehensile tail, plate-like scales like those of the sturgeon, and a pouch like the kangaroo's. The creature also reverses the ordinary way of Nature in that "child bearing" is exclusively a function of the male.

The seahorse is almost world-wide in its distribution in warm ocean waters where there are growths of sea vegetation. Although they have provided the models for some of the nightmare monsters of the human imagination, they are small, feeble and almost defenseless. The head is unquestionably similar to that of a miniature horse in general outline. The neck, however, is no neck at all. What looks like a neck is the forward part of its body. Its shell-like covering left early naturalists in doubt as to whether it was not some monstrous sort of a water-bug, but it is a true fish. Its weight, and its single fin, leave it an inefficient swimmer, and it is able to swim at all only because of a large air bladder so delicately adjusted to its

specific gravity that if a bubble the size of a pinhead is let out by a puncture, the seahorse sinks to the bottom. There it moves clumsily about until the wound has healed.

Being a poor swimmer, the seahorse must have other means of adjustment to its water environment. A prehensile tail that it can wrap around water plant stems affords this. It would be rather difficult for an enemy to take *Hippocampus* by surprise, as he can move his eyes independently of each other, thus looking backward and forward at the same time.

The greatest anomaly of the species is its way of reproducing. The male actually "gives birth" to the living young. Unfertilized eggs are laid by the female, who places them, a few at a time, into a pouch-like organ on the under side of the male's body. In some manner unknown to biologists, they are fertilized in the transfer. The eggs are incubated in this pouch and remain for some days after they are hatched. Then, the living young, fully equipped to take care of themselves, are expelled.

The seahorse has the distinction of being one of the species of fishes that "talk." It makes almost inaudible snapping noises with its jaws which may serve as a means of communication.



MR. SEAHORSE HIMSELF

He has a face like a horse, plate-like scales like a beetle, a prehensile tail and a pouch like a kangaroo's, but he is a fish just the same

Aardvark—God of Evil

By ERNST SCHWARZ

ONE of the most remarkable animals that the Boers found when they first settled in South Africa was an animal they called "aardvark," or ground-hog. This is a harmless creature about the size of a large pig, with an elongated snout, large ears and thick skin. Its huge claws enable it to dig up the insects upon which it lives, especially white ants, and, also, to dig burrows and holes where it hides. Formerly it was held to be closely related to pangolins and sloths, but it is now known that it is an offshoot of an early type of the ungulates, or hoofed animals. It is not surprising that so grotesque an animal should arouse awe and superstition among primitive peoples. In fact, the ancient Egyptians assigned to it a place among their deities. It was the animal sacred to Set, the God of Evil, and was considered to be his personification.



PHOTOGRAPH COURTESY THE BERLIN ZOO

★ Conservation ★

A part of Nature Magazine each month is devoted to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.



HUNTING LICENSES AND DUCK STAMPS

annual summary of the moneys paid out by the sportsmen of the United States for licenses in 1936, the latest year affording complete data. In this summary, lately released, the Survey assumes a myopic attitude, hailing an increase in hunters as a factor favorable to the protection of wildlife. In 1936, says the Survey, sportsmen in the United States and Alaska paid \$10,466,237.37 for 6,658,158 licenses, and \$603,623 for duck stamps. There were increases in about forty states and Alaska in both the number of licenses and the money derived therefrom, and an increase of non-resident licenses in fourteen states. The cause for congratulation, as we take it, is explained in the official release. We quote:

"Greater interest in hunting, improvement in waterfowl conditions, and effects of skeet shooting on hunting are cited by Col. H. P. Sheldon, chief of the Survey's Division of Public Relations, as principal causes of the increase in license sales. He explains that a revival of interest in waterfowl hunting was to be expected with improvement in hunting conditions following several poor seasons. Skeet shooting, he adds, has given hundreds excellent training in the rudiments of handling firearms and stimulated interest in field shooting.

"The hunting license figures are of special interest this year, Bureau officials point out, as the new Federal-State wildlife act approved by President Roosevelt last September authorizes Federal aid to States for wildlife restoration projects on the basis of their size and number of hunting licenses sold. The act becomes effective July 1, 1938, and authorizes Congress to appropriate sums for such wildlife projects equal to the revenue derived from Federal taxes on firearms, shells, and cartridges."

We are frequently moved to pity for this Bureau, the only Federal agency actively engaged in wildlife research

The following concerns the Biological Survey's annual

and protection. With an array of data on the wild birds and mammals of North America that surpasses in completeness and reliability any similar mass of information ever gathered for any country, it would be presumed to have plain sailing. Yet with all this to back its actions, and specifically charged with the protection of migratory birds, the Survey's beneficent efforts are constantly thwarted by various interests masquerading as conservationists. Thus it is frequently forced to compromise, or even to adopt measures contrary to its convictions, and must continually battle even to maintain a course that is far short of its preferred goal. Small wonder, then, that its decisions must sometimes draw fire even from its friends.

A notable case of unjust criticism is the attack on the Survey at the recent Wildlife Federation Conference by the spokesman of More Game Birds in America, Inc., an organization that is always self-draped in the mantle of conservation, but that really is driving constantly for more shooting privileges, and even now is seeking continent-wide influence. In this attack the waterfowl regulations of 1937, which we believe were far too liberal, were assailed as too drastic, and the now moss-grown threat to wrest the administration of the Migratory Bird Treaty Act from the Survey was renewed.

This, however, while only a threat, is insignificant in comparison with the influences that have already fastened their grip on the Survey, and whose subtle by-products are discernible in the two brief paragraphs above quoted. The allusions to skeet-shooting as a factor in hunter increase, and the effect of this increase in added funds for wildlife protection, are referred to.

Skeet, merely a particular method of clay-target shooting, has usually been considered a sport beneficial to game, since people breaking "clay-pigeons" cannot at the same time kill birds, and are thus benefiting the ammunition industry without reducing wildlife. Now, however, since the itch of the trigger-finger seems to have been

translated into an urge to use the skill acquired on living targets, the Survey implies that skeet has attained a new glory. Why? Because this urge results in more hunting licenses, and in more taxes on more guns and shells, and, therefore, there is more money for States to "protect" the birds that, naturally, will be killed in greater numbers. This is a form of logic to which we cannot subscribe, because the aggregate of these small taxes is out of all proportion to the wildlife destroyed. In yielding to this sophistry, the Survey seems to have forgotten that many of the best-informed conservationists in the country have always opposed both the duck stamp and the ear-marking of the ammunition-tax, and still consider them of dubious value. Indeed, the very fact that the Survey is led to point out the supposed beneficent nature of increased hunting, at a time when its own experience of the year past has shown a defiance of law that, taking into account the deplorable

state of our game resources, seems to us an indication that the venom implanted in these pieces of legislation is starting to do the work that was in reality the reason for their inception. This increased number of hunters, styled "sportsmen", includes, besides some true sportsmen, an army of duck trappers, baiters, bag-limit violators, pump-gunners, duck sellers, fake-conservationists, and numerous other hypocrites beside whom the old-time market-hunter was at least honest in his attitude, and who generally operated within the law. But each shooter of today, in some way, contributes to either the license revenues or the ammunition tax, and thus to "conservation".

Is it any wonder, we ask the unprejudiced reader, that many people, while not objecting to hunting in moderation, are now finding themselves obliged to oppose sport-shooting because of the unsportsmanlike methods resorted to by its proponents.

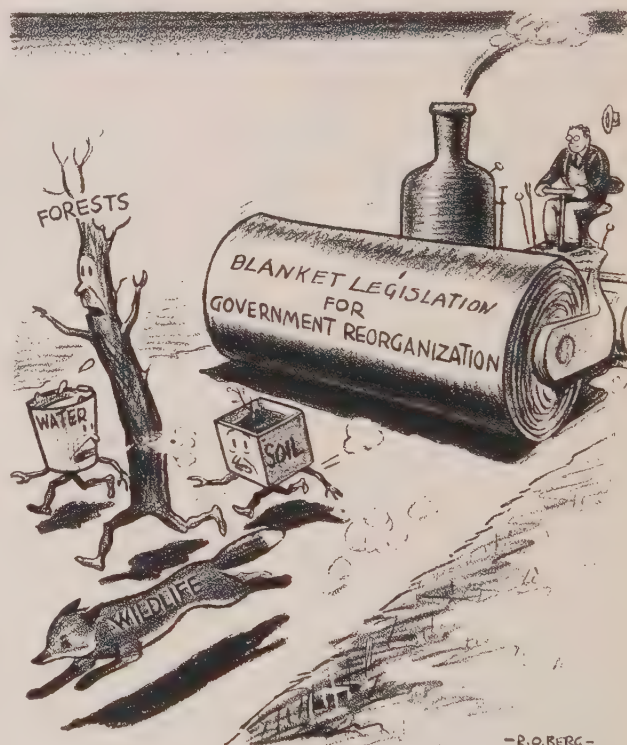
BUREAU BILL★ PASSES SENATE

As this issue of Nature Magazine goes to press the Senate of the United States has just passed,

virtually unchanged, the bill authorizing drastic reorganization by the President of the Federal Departments. Concurrence by the House of Representatives is regarded as likely. All amendments exempting specific agencies from transfer were defeated. Therefore, possibly before this is published, Mr. Roosevelt is invested with tremendous power over far-flung activities of the Government. He is also faced with a grave responsibility, one which, we are confident, he fully realizes.

Our concern with this legislation has been solely from the viewpoint of its effect upon the conservation of our natural resources. We have opposed this piece of legislation because it confers broad and comprehensive authority for bureau juggling without offering any definite plan of actual steps to be taken, and therefore gives no opportunity for many conservationists of standing and experience to present their views. We have feared it because it seems to be based upon the recommendations of the Brownlow Committee, whose report to the President definitely failed to recognize any difference between renewable natural resources and non-renewable natural resources, and exhibited a naïve tendency to obscure the real difficulties beneath a cloak of well-sounding but impractical theory. We have repeatedly expressed our views clearly, and they are to be found, further expanded, in the currently available American Nature Association *Quarterly Bulletin*.

Considerable water has gone over the dam since the issuance of the Brownlow report on federal bureau reorganization. Surely the President has heard the views of leading conservationists who have argued reasonably and, we think, convincingly, against the desirability of taking the Forest Service, the Soil Conservation Service, and the Biological Survey, out of the Department of Agriculture.



NOT THE WAY TO DO IT

The President has heard the widespread demand against hasty action, and the pleas to consider the importance of ecological relationships in making any new grouping of conservation bureaus. We have been glad to offer the benefits of our own study and experience. But reorganization is now, or is about to become, solely the President's responsibility. It is still our sincere hope that there will be no shifting of conservation bureaus without the hearing and weighing of all views of individuals and organizations interested in the conservation of our renewable natural resources. There is so much at stake that precipitate action cannot be justified.



IN THE WAKE OF FLOOD WATERS

Typical debris left after the rushing waters of the Ohio River had moved on to the sea during the flood of January, 1937

The Rising Tide of Floods

*Another article in the series on the
problem of erosion*

By HENRY H. COLLINS, JR.

Photographs from Soil Conservation Service

SHIVERING dwellers in the Ohio Valley last year saw their possessions swept away and hundreds of their fellows drowned in the greatest inundation within their memory. Higher and higher against weakening flood walls and levees rose the swirling waters. Farther and farther from the crumbling banks the bewildered citizenry heard the swift-rolling, angry murmur of the tide, as the growing volume of water increased fourfold and fivefold the speed of the floodrace. Trees, houses and livestock careened past on the gaping surges, yellow-brown with the 300,000,000 tons of new and unreturnable soil they were bearing to the Gulf.

Yet in 1534, on the present site of Helena, Arkansas, De la Vega gazed upon the flooded Mississippi when the Father of Waters buried for eighty days twenty leagues of land on either bank. Rock marks at the second cataract of the Nile also remind us of floods 1800 years before Christ. What is the truth about floods? Are local floods getting worse; are big floods getting bigger? What, if anything, can be done about them?

Twenty years of statistics illustrating the growing size and frequency of local floods may now be added to the great bulk of non-statistical evidence long available. Reports of old inhabitants may perhaps be discounted, but can scarcely be ignored. Writings of early settlers attest to the perennial flow of clear water in streams that now yield only intermittent flash floods through normally dry washes. The more recent strata of flood plain deposits along most watercourses show a great increase in sand and

gravel. Indeed these furnish perhaps the most convincing proof of the greater violence and destructiveness of our modern deluges. For, on top of the fine and fertile silt deposits laid down by such old time inundations as that witnessed by De la Vega, today are found layers of coarse sand and gravel piled up in swirling beds. The most recent are the thickest and coarsest.

Furthermore, test plot experiments of the Soil Conservation Service furnish striking small scale proof of the danger that storms now bring on a large scale to entire watersheds that have been stripped in varying degrees of their original cover. In addition we have the reports and observations of a growing number of competent and scientifically-trained witnesses. All this leaves little doubt that the operations whereby mankind has disturbed the natural balance of Nature have also contributed to the increase in the number, magnitude and severity of local floods. The axe, the plow and the cow, fire and fumes, those agents that have long been destroying our trees, grass and soil, we are now learning, are also responsible for our bigger and more frequent floods.

Lumbering operations, with their heavy machinery and dragging of logs, make way, even under the best conditions, with much of the forest litter that is so important in absorbing moisture. Lumbermen cutting only for the quickest yield do far greater damage. Not only do they injure the forest litter, but they destroy the undergrowth so essential for holding the soil; and they leave behind great quantities of slash, which become bone dry in a year



FERTILE FIELDS OF A COUNTRY-SIDE IN STEUBEN COUNTY, N. Y.

Morgan's Bridge over the Cohocton River, which runs along the D. L. & W. R. R. tracks, seems only to span a quiet stream that wanders through prosperous farm country

or two and create a serious fire hazard. More truthfully than Louis XV might such vandals remark, "*Après nous le déluge.*"

Dense aspen once replaced within a year a clear-cut conifer forest at Wagon Wheel Gap in the high mountains of Colorado; but the next season the yearly runoff was found to be about 15 per cent more than that from an undisturbed watershed nearby. Although this annual total was relatively moderate, nevertheless, it was found that the *flood crests* were increased by about 58 per cent in the streams flowing through the cutover area.

The effects of the plow are even more serious. Tilled land lacks the ability to absorb moisture formerly provided by grass or forest litter. With the disappearance of the vast insect and small animal population of forest floors, whose tiny passageways formed an intricate network through the upper earth, and with the elimination of the holes and channels once occupied by the root systems of trees and shrubs, the soil becomes far less porous than it was under a forest canopy. And its porosity rapidly declines, sometimes by as much as 90 per cent. The original pores become filled with solid particles suspended in rainwater, which now picks up silt as it runs over the bare land instead of being dispersed in a clear spray as when it fell on the primeval forest.

Frozen ground also is capable of absorbing little rainfall. In winter cleared land is frozen more deeply and for a longer period than when the forest covered it, because snow lies longer in the shade of a forest and snow-covered ground is less likely to be frozen than bare ground.

Where improper farming methods are in use, such as straight rows up and down the slope or incorrectly devised terraces, rainwater concentrates in hundreds of little furrows and inadequate terrace outlets as it rushes off to the next streambed on top of the ground. All these things immediately induce erosion of the topsoil. As this disappears the less permeable subsoil is exposed and the chances of water absorption, already lessened, are now still further reduced. Under primitive conditions, however, far more of the rainwater would have soaked its way into the soil and reached the stream long afterwards by percolating slowly through the ground rather than by rushing rapidly over its surface.

As erosion continues, the furrows become rills and the

rills gullies. As these grow longer and wider and deeper, they carry off more surface water with each rain. Precipitation thus reaches the larger streams not only more swiftly but in greater volume. The stream channels, unadapted to these sudden and excessive demands, cannot contain this great quantity of water, which then overflows their banks and floods the countryside.

Soil washing from sloping fields is in turn deposited as sediment in the streambeds. This raises the level of the river floor, tends to decrease the capacity of the channel and thus causes the stream to overrun its flood plain with greater ease and with greater frequency.

Where the farmer with the plow gives way to the cowboy on horseback the landscapes change but the tragedy continues. A grass-covered slope absorbs almost the entire downpour from any rain storm. But where too many goats or sheep, or cattle or horses, are allowed to graze, this cover is impaired or destroyed, or changes its character until the water runoff may be as high as 60 per cent. The same processes are repeated as in humid regions and the



TREES AND GROUND LITTER

They combine to absorb the moisture of melting snow or sudden rains and check the runoff of waters that are potential floods

A LITTLE FLOOD TAKES ITS TOLL IN FARMERS' CROPS

The same scene as that on the opposite page when the waters of the little river inundated the fields, bridge and the railroad track. The annual cost of such floods is large



ancient watercourses, unable to contain the vast amounts of water pouring down, overflow and devastate their flood plains.

Fire annually ravages 40,000,000 acres of forest land in the United States. Where it does not destroy all the standing timber it may, nevertheless, burn up the forest litter and make serious inroads into the humus beneath. This, too, greatly diminishes the absorptive power of the soil. Subsequent rains are no longer soaked up by the ground to preserve moisture over long periods of time. Instead they rapidly combine, first into open flows and then into torrents that alarm a fire-stricken countryside both with the menace of floods and the waste of erosion.

A striking example of the damage that so results was witnessed by the survivors of the destructive floods which swept Verdugo and Haines Canyons in Los Angeles County on New Year's Day, 1934, causing the loss of 34 lives. A severe storm had deposited an average of 12 inches of rain within sixty hours on a fifty-mile belt of foothills and mountains. The particular watersheds whence

the flood originated, however, totaled only 4000 acres in area; but they had been partially burned over a few weeks before. San Dimas and Arroyo Seco Canyons, both close at hand, had been untouched by the fire. These experienced the same rainfall, and yielded a maximum flood discharge of 58 cubic-second feet per square mile; but from the two charred watersheds the flood discharge reached 1000 cubic-second feet per square mile, 1700 per cent more than that from the unburned area. Erosion, moreover, from these devastated watersheds removed as much as 67,000 cubic yards of soil per square mile as against only 56 yards per mile from the undamaged canyons. Other observations from the Santa Clara Valley in California show that runoff may increase twentyfold and erosion by as much as 2300 *times* on slopes that have been stripped of their vegetation by fire. During the cataclysmic deluge in early March of this year in and around Los Angeles, far worse than the one four years ago, the Santa Ana River is said to have silt-sullied the blue Pacific for a distance of ten miles from shore.

Few more desolate landscapes have been imagined, or described, by authors of weird stories than that which today encompasses Ducktown, Tennessee. In this southeasternmost corner of the state an area of ten to twelve square miles around the industrial smelters has been denuded of virtually *all* vegetation. Beyond the utter desert of the worst fume-struck district the country is still only sparingly wooded for a considerable distance. Studies of this spectral region reveal the debt mankind owes vegetation in retaining runoff and stopping erosion. Where all plants have been destroyed surface water discharges of more than a thousand cubic-second feet per square mile have been measured after rainfalls that caused a flow of barely fifty-second feet from a like area of neighboring forest. A single storm has initiated a loss of as much as eight tons of soil per acre from one small denuded watershed, while washing scarcely a thimbleful of earth from an acre of forest nearby.

The damage caused by floods is colossal. Several hundred lives were lost and 800,000 persons made homeless last year in the valleys of the Ohio and Mississippi alone. Direct damage was estimated at \$400,000,000 and indirect damage at another \$400,000,000. Threats of epidemics—pneumonia, typhoid and dysentery—caused by



NATURE HAS A PROBLEM HERE

Typical sheet erosion on burned-over and logged-off lands in northern Idaho. Grass and reforestation would restabilize such areas

FLOOD DAMAGE TO A NEBRASKA FARM

Crops were buried under this sea of silt, and the house was carried a quarter of a mile by the raging waters

exposure and by a suspension of proper medical and sanitary facilities menace every flooded community. Paradoxically there is frequently a deficiency of pure drinking water as floods interfere with customary water sources or extinguish the fires of low-lying pumping stations. Moreover, in flood times, in addition to the physical damage to industrial plants located in such places the suspended operation of these factories causes a further loss in wages. Everywhere communications are interrupted, highways overflowed and railways washed out. Indeed, due to the growth of the country along the natural arteries of transportation, the greater part of our population and property is gathered in potentially flood-threatened river valleys.

Of the 3,000,000,000 tons of soil annually washed off our continent by accelerated erosion, by far the greater part, it is believed, descends oceanward under the impact of flood water, because the power of moving water to carry soil in suspension increases manyfold (according to some authorities as much as 32 times) whenever the velocity of the liquid is doubled. Furthermore, an excess of water in the rivers reflects a deficiency of water in the soil, with small crops and big dust storms.

Areas subject to frequent overflows are no fit places for permanent habitations. Nevertheless, economic necessity compels many to occupy old waterfront houses that precariously survive successive inundations. As a result, the resources of Federal and local governments are subjected to increasing demands for the rescue, care and rehabilitation of the unfortunates who live in these floodways.

We do not yet know the entire story of how much present day inundations differ from those witnessed only by awestruck Indians or stampeding buffalo, or how much greater they are than in the time of De la Vega. We do know, however, that local floods are on the increase both in severity and in frequency; nor is it unreasonable to foresee, if accelerated erosion remains unchecked, a gradual growth (which indeed we may even now be observing) in the size and frequency of big floods on larger streams. As a portent of the future we have but to consult the experience of unfortunate China where accelerated erosion has twice within eighty years caused the Hwang-Ho to alter its downstream course; and with each change this Yellow River has ravaged hundreds of miles of heavily populated countryside, and taken thousands of lives and destroyed millions of dollars' worth of property.

The control of high waters is a twofold problem. It involves prevention of the rapid onslaught of the waters



from upstream as well as keeping them within their banks downstream. Floods can best be checked initially by controlling *accelerated* erosion on the upstream drainage basins whence their waters originate. Hugh H. Bennett, Chief of the Soil Conservation Service, has repeatedly called attention to the fact that proper erosion control on the watersheds of our streams would substantially decrease the crest of flood waters, and would usually confine the swirling currents to their normal channels.

No degree of upstream efforts, however, can, or should, hope to prevent floods not essentially caused by accelerated erosion or sedimentation. Control of such "natural" deluges must include downstream embankments, levees or dams. Likewise, flood plains cultivated or inhabited by mankind, yet subject to "normal" seasonal inundations, can, of course, be protected effectively only by artificial dikes and ramparts. At the same time it is the *excess* runoff caused by *accelerated* erosion that converts many a seasonally high stream into a flood. Remove this additional water and most of our local floods would never occur.

If local freshets could be diminished, great floods would cease to be the menace they now are. But the longer floods continue and increase, the longer erosion is unchecked, the more difficult and costly the eventual control becomes. And until excess runoff and erosion are controlled, our soil resources, age-old and irreplaceable, will go on being swept seaward, as they are today, on the crests and in the body of flood waters which every year increase their size, their frequency, and their devastation.

In early biblical days mankind was so awed by the deluges which periodically afflicted the valleys of Mesopotamia that the heroic legend of the Ark has been embedded forever in our culture. On the spectrum colors of the rainbow Jehovah is said to have made a covenant that He would never again allow floods to threaten the seed of Noah. But if our later generations ravish the land and waste our water, is the promise still binding? If the soil goes, can the earth remain? And in His vow Jehovah stipulated, "*While the earth remaineth*, seedtime and harvest, and cold and heat, and summer and winter, and day and night shall not cease."

The Ingenuous Carpenter Bee



THE CARPENTER BEE

Its jaws are of the cutting forceps type; the longer and lower blade doing the cutting, the upper the tearing

*An artisan of parts,
this insect can lay
claim to intelligence*

By S. F. AARON

Illustrated by the Author

SOLOMON, the proverb maker, might better have proved his wisdom by advising the sluggard to seek and profit by the wasps, bees and termites. There can be no question that these insects excel in hereditary ingenuity whether we credit it to instinct or modified intelligence.

Among the dumb creatures there are many degrees of sense not clearly understood. *Xylocopa*, the carpenter bumblebee, is a case in point. Her life is full of problems largely because of parasitic insects that eat her helpless young. Escaping this danger, the bees-to-be hibernate in individual, snug retreats made by the mother, and emerge as adults in the early spring.

Care of the next generation with the highly-developed families of beetles differs from that of the social and solitary bees and wasps. With few exceptions beetle larvae burrow for themselves, feeding as they dig either in wood or soil and thus making their own domiciles. For the more helpless larvae of the bees and wasps the mothers prepare their nurseries with every care, store food for the young, and thus show a high degree of intelligence for creatures commonly rated as lowly.

The carpenter bee has jaws that are strong and suitable for cutting and chipping, but it wisely selects dry, seasoned wood, usually of kinds easily worked, such as pine and the softer hardwood species.

After being successfully courted by one of the many darting males—gay blades and swift of wing—as they chase each other about old buildings, or hang suspended in air for long seconds, Madame *Xylocopa* turns at once to the duty of insuring the safety of the next generation.

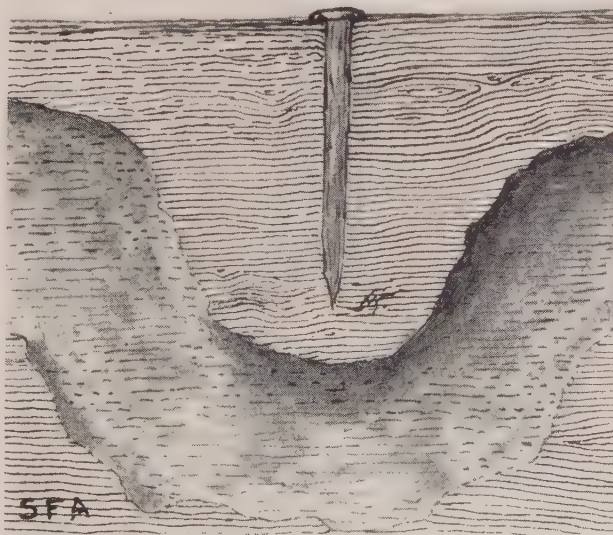
In her choice of material and her general method of boring long holes wherein to make tight cells for the young, the carpenter bee probably acts by hereditary instinct. But varied conditions call for something

more. She is not content with a burrow merely deep enough to hide the youngsters that occupy the series of single cells; there must be ample depth for certain fortifications to discourage entry of enemies. So long, dry fibres are cut from grass leaves, small stems, grapevine bark and the like, and are well packed in, sometimes occupying a space of two or three inches outside the cells.

Really, however, she usually overdoes this and gives herself unnecessary labor, because in most cases another batch of these fibres is placed at each end of the burrow, which may be from twelve inches to more than two feet in length. This is done before the cells are made and it would be difficult for an enemy to enter at these ends.

The mother bee is less than an inch long, with an outside body diameter of more than three-eighths of an inch with her legs well drawn in. She makes a burrow somewhat exceeding half an inch at its largest diameter, but, in places, considerably less. The entrance hole, across the grain, is rarely more than three-eighths of an inch, or more than half an inch, in length before the actual burrow begins. This always runs lengthwise with the grain.

Generally about six inches from the entrance hole are placed the first of the cells, each about half an inch in length and separated from its fellows by partitions, concave on one side or on both, and composed of clay or sand mixed with saliva. This makes a harder, stronger material than that prepared by either the mud-dauber or the potter wasps. As many as five or six cells (or even seven) are usually made in each burrow; sometimes there may be only one or two, even in a burrow twelve inches long. Often the whole mass is placed near the far end of the burrow, and the remaining space from the entrance is left empty, much work being done that is practically useless against the attack of its enemies.



THE BEE IS PUT TO A TEST

A nail driven into a board in front of the unfinished burrow resulted in the bee making a detour to avoid it. But how did she know that it was there?



A LOOK INSIDE THE BURROW OF THE CARPENTER BEE

At the left is this clever mechanic in the passageway she has cut out and with the entrance above her. Below we see the cell structure of this insect with a half-grown larva, a silken, leaf-like pupa and the head of a fully developed young bee about to cut its way out. The cutting of these burrows is remarkable and the care taken to protect the offspring from the parasitic enemies that attack them is equally so. These abilities may come from hereditary instinct, but many things that the bee does to meet unexpected situations suggest a measure of reason and give support to the claim of intelligence for this insect

For the most part, however, the workmanship is expert, and thus the carpenter-bee is both a good wood-worker and mason, although a rather inexpert weaver. This combination of ability is rare. The carpenter bee's further abilities are shown by the gathering of pollen to store as food for the larvae, and there is never too little of this. It has been stated that in making her burrow the carpenter bee progresses at the rate of about half an inch a day, but there is a vast difference in the industry of the individuals. I have seen one take more than two weeks to produce a burrow in soft pine a foot long, and again I have seen a bee cut to a depth of more than two inches in a few hours.

However complicated this entire process of woodworking, cementing, and weaving proves to be, the mentality of the carpenter bee is best judged by its ability to overcome obstacles, or rather to avoid them. Although she is averse to cutting across grain she will do this for a considerable distance when necessary. There is brain work, beyond doubt, in this, and also evidence of that sixth sense that occasionally crops out in Nature.

I have before me a specimen of white pine lumber in which a burrow starting about seven inches from the end of the board continued in the same direction until within a full inch of the end. Here the bee turned at right angles, across the grain, met with a hard knot, bored a little around and past it, and then continued back with the grain to a point close to the entrance.

In another case I drove a nail into an inch-thick board



about one inch ahead of the burrow under construction. Here, ascertaining the position of the obstruction from within, the bee turned, bored downward across the grain, proceeded under the point of the nail and—mark this—again bored across the grain upward and continued lengthwise almost in line with the first section of the burrow. How could these bees have learned the distance to the end of the board, and the position of the knot, or of the nail, an inch away from them? Does this ability come from the same sense that prompts them to bore lengthwise in a board not over seven-eighths of an inch thick for fully eighteen inches, without making the walls of the burrow less than a sixteenth of an inch thick at any point? And how does the bee know how to bore another burrow not more than an eighth of an inch away from the first, but never at any time letting the two combine, except where a passage between them is necessary? To try to answer such questions is what makes Nature ever fascinating.

Naturalist's Lament

By BARBARA SCHMITT WHITNEY

I have seen trays made of butterfly wings—
Trays on which ladies pass polite tea
And little sandwiches and cakes;
And I have seen men in evening clothes

And women in shimmering negligée
Walking on white fur rugs—
Stepping upon the glorious heads of animals,
Dead before their time . . .



THE BIRD that ADOPTED MICHIGAN

By
MARGARET E. GROSS

THE BIRD AND HIS VOICE

Kirtland's warbler as photographed by Walter Hastings, and, at the right, a section of the sound track on which Albert Brand recorded the song of this bird among the Michigan jack-pines



BRIGHT yellow of breast, gray of back, sweet of song—at last we saw before us the bird we had come to find, *Dendroica kirtlandi*, the Kirtland warbler, also called jack-pine warbler for the jack-pine forests in which it nests.

Wood warblers are strictly an American group, and this species is the rarest of them all, wintering in the Bahama Islands and nesting only in Michigan. Not only that, but in its choosy way only a few counties, notably Oscoda and Crawford, are acceptable. Even though one may live in Michigan, that state is large and few people live in the area near Grayling where the bird nests. Because this bird has chosen Michigan as its home (home technically meaning where the young are raised) the Michigan Audubon Society has selected the bird as the name for its bulletin. Many feel that it should be the State Bird, for very few states have a monopoly on the nesting of any one species.

Not only must the nesting site be in Michigan, and in a certain area of that state, but the trees among which it nests must be jack-pines, and these not more than ten feet high. Discovering a colony is not easy, and many likely-looking woods are scorned by the bird. The presence of the male is most easily discovered when he is singing, for, though not a shy bird, and large for a warbler, he is among foliage so dense that it is often difficult to detect him even when singing.

The bird we had come to see was first described from a specimen taken by Dr. J. P. Kirtland near Cleveland, Ohio, on May 13, 1851, and was named for him, even though it was later found that a specimen had been taken in October, 1841, by Dr. Samuel Cabot, on shipboard off the Bahamas. The nesting territory was discovered in 1903 by Norman A. Wood, now curator-emeritus of birds, University Museums, Ann Arbor. Since this warbler is one of the tamest of birds, the taking of too many specimens was feared, and Michigan passed a law limiting

sharply the number of the species that may be collected.

To us, the reality of seeing this bird for the first time eclipsed all other adventures earlier in the trip. Here, before us, was the bird we had so often sought with eagerness during migration, for it is but rarely seen between Michigan and its winter territory. We had measured off the mileage from the county line as directed, and, immediately after we stopped, this new, wild song had rung out not fifteen feet away. Probably an uninterested person, if asked what it was, would say "a wren," meaning, of course, the house wren. Yet the song resembles more that of the water-thrush. It starts with three or four staccato-like notes, then ends with an enthusiastic "wee chee chu." As with all bird songs, description in words is unsatisfactory. But there is none of the rasp or buzz of many other warblers, such as the prairie or black-throated green. It is clear, arresting. One knows at once that it is "different." There is a slight variation in individual songs.

We did not see any females on May 22, although they may have been present. When we returned on May 26, they were there and nest-building had begun, two being almost completed, one well started, and a fourth, not located, was being built, as the female was carrying nesting material.

The cause of our immediate return to the Kirtland warbler territory is worthy of further comment. We had timed our arrival home to coincide with a lecture to be given by Dr. A. A. Allen, ornithologist of Cornell University, on his experiences photographing rare birds. His motion pictures were accompanied by sound recordings of the birds' songs made at the same time by Mr. Albert Brand, also of Cornell University. To our delight, Mr. Brand was also present and they were even then bent on obtaining more material, and especially the song of the rare warbler we had just visited, and to whose territory we could so easily direct them. Mr. Brand has

published two books on bird songs, with supplementary phonograph records of dozens of the songs. With them was their assistant and, of course, their sound truck. The machinery for recording the bird songs is compactly stored in the truck, and is operated by Mr. Brand. A microphone, mathematically correct in its location at the focal point of a large parabolic reflector that intensifies the song about two hundred times, picks up the sound, which passes back to the truck through a cable. Conditions must be favorable, for any sound other than the one desired is magnified as much as the song. So sensitive is it that the buzz of a mosquito passing is clearly heard. The reflector is turned directly upon the singing bird, or the point where he seems to be if he is not visible.

As soon as the song is picked up by the microphone, an indicator records the intensity. When it is sufficiently loud, the push of a button starts the motor that turns the film and records the sound. Thus are preserved, for those of us who cannot travel, songs from distant lands, and for others who wish to repeat in their own homes a song until it is learned beyond forgetting. Best of all, the little singer who supplies the song is left behind, undisturbed, and unaware that he has added his bit to science.

Like most birds, Kirtland warblers sing their best in the early morning. On the day when Mr. Brand made most of his recordings, we arrived so early that the birds were not yet active! The truck was parked and the microphone placed a few yards away near the spot where we had already heard a few tentative "chee wee"s. A few minutes later we heard singing all about us, the birds now giving the full song. This was about five-thirty. By eight the males were singing spasmodically, spending the intermittent time, we found later, escorting the females about on their nest-building activities. But many feet of excellent recordings had already been made.

The male sits quietly while singing, and remains within his "territory"—the area he has appropriated as his—unless pursued by ardent bird students desiring a glimpse of him. Most warblers sing as they eat, working about the twigs of a tree, hunting for insect eggs and larvae. But the Kirtland sits near the top of a pine, often a taller tree than the surrounding ones, his yellow breast gleaming, the black streaks showing along the sides of the breast, the

black cheeks visible as he cocks his head. Surely no other bird could be mistaken for this one. The female, too, is distinctively a Kirtland warbler. Unlike many female warblers, she is very similar to the male, but the breast is less bright, the sides of the head are all gray, and one instinctively knows she is duller-colored, even though still bright. We noticed that the tail-wagging is marked with the female; the males were seen to make few bobs,

while the females, when perching, bobbed the tail constantly. Sometimes the white wing bars showed conspicuously, at others they were barely apparent. There were certainly five pairs in the area, probably eight.

The nests are easy to find. Pick out a singing male, sit down on the ground, and presently he will stop singing and join his mate on or near the ground, for these birds are much at home there. If she has not already a bill-full she will soon pick up some dry grass or tear a few strips of bark from a jack-pine. Then she will flit from tree to tree and finally disappear. If it is too far away, move closer and presently you may watch her disappear under a tree. The presence of a human, if he is quiet, is not in the least disturbing. By any other method one

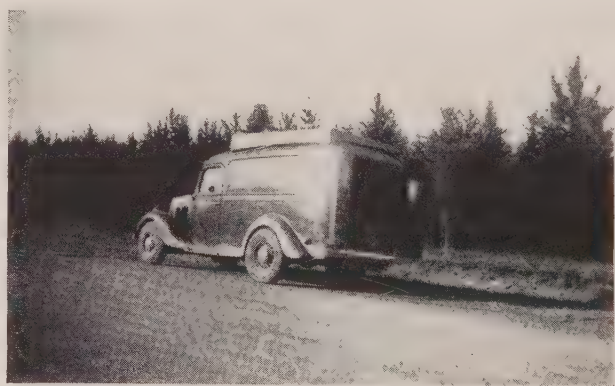
would find a nest only by the sheerest of accidents. It is located on the ground among the brakes, close to the base of a jack-pine perhaps two inches in diameter. A depression is made in the earth, and lined with grass and bark-fiber. The vegetation above is not disturbed. The first nest we found had a dead stalk of brake bent above it and a small piece of bark. Several runways led away from it, from four to seventeen inches in length. All were covered by dry vegetation. Credit is due to Harold Axtell, Dr. Allen's assistant, for discovering the well-hidden runways, as well as for making other observations. A photograph of the nest site shows nothing of it. Besides, the woods are so dense that photography is difficult. The trees grow so closely that, small as they are, the branches interlock.

Other birds commonly present in the same area were the hermit thrush, upland plover, slate-colored junco, black-throated green warbler, ovenbird, and chipping sparrow. These were abundant. The wailing whistle of the upland plover—rising to a tremulous quaver, then dying away in an unearthly (Continued on page 309)



TYPICAL KIRTLAND WARBLER COUNTRY

Jack-pines where this bird makes its home, and, below, the sound truck carrying the apparatus for capturing bird songs



Things to Think About

INTERESTING commentary on the great quantity of wildlife remaining is found in the report of the New Jersey Fish and Game Commission that 1415 licensed hunters visited the public hunting grounds in Hunterdon County during the 1937 upland game season. They took away in their bags 181 pheasants, 891 rabbits, 15 squirrels and 3 woodcock—a total of 1090 game animals. The remaining 325 nimrods got the exercise.

At the annual meeting of the Wildlife Society held in Baltimore, A. A. Allen of Cornell University was elected president; F. H. Langlois of Ohio, vice-president; V. H. Cahalane of Washington, D. C., secretary; Warren W. Chase of Iowa, treasurer. W. L. McAtee was reappointed editor of the *Journal of Wildlife Management*, and William L. Finley was elected a trustee. A resolution was passed calling for investigation and control of the wilt seemingly threatening the native American persimmon, an important wildlife food in our southeastern states.

Increase in the numbers of deer in Connecticut is becoming a problem, according to the State Board of Fisheries and Game. Protected since 1900, they have increased gradually. Life in a closely settled state like Connecticut is complicated for deer, however, because the Board reports that 349 of these animals were known to have been killed in 1937. Eighty-six collided with automobiles; five were struck by trains; 21 died in other accidents; 19 were killed by dogs; 26 were found injured and destroyed; 26 found dead for unassigned reasons, and 39 were killed illegally. However, exercising a legal right to protect crops, farmers reported shooting 127, and it is believed that more may have been shot for this reason.

Authorization of the acquisition of about 26,000 acres to round out Great Smoky Mountain National Park, and to enable it to be given full National Park status, has been approved by Congress and the President. Funds are now needed to purchase the land. The rapid increase in the number of visitors to this Park makes proper development essential but this must wait on complete acquisition. Approximately 410,000 acres have been acquired.

The Minnesota Department of Conservation gives this following excellent definition of the title "State Park", saying: "A State Park is a typical portion of the State's original domain of adequate size, whereby a small part may be provided for concentrated use, and the remainder preserved in primeval condition, accessible only by a system of foot trails and waterways, by which the future generations may study the flora, fauna and geologic structure of a beneficent Nature, unspoiled, unimproved and unbeautified by Man's attempt to improve on the work

of the Master Engineer." This is a fine standard.

The Rhode Island Department of Agriculture and Conservation has a lot of snowshoe rabbits from Canada intended to stock game areas but no place to put them. The Department bemoans the fact that large areas of land have been posted against public hunting.

After reading the reprinting of the account of the gallant struggle of a Connecticut warden with an eagle, printed in our January issue, Eleanor S. Warner of Susanville, California, wrote and sent this gentleman a satiric poem. She sent us a copy and with it a letter with some interesting comment as follows:

I want you to know that my heart is with you in your fight to preserve the remaining species of wildlife that are disappearing so rapidly in the United States. I live in a section of the Sierras where all wildlife was very plentiful, but seldom now do we hear the geese honking over during the night, or see the wedges of ducks stream across the blue above the hills. Seldom do we hear the wail of a coyote. Every year bird lovers must hear of the slaughter of those valuable seed-eaters, the wild doves. Every deer season we are compelled to see cars festooned with the carcasses of splendid mule deer that are harder and harder to find as the years pass. The cry is always "well, if I don't shoot them someone else will and I might just as well have them while they last." For several years I spent my summers at Eagle Lake and was there during the deer season. It was not uncommon to find does and fawns that had been slaughtered and left to rot on the ground. The slaughter goes on and prizes are offered for the biggest buck. The small fur animals are about gone. The virgin forests are being hauled to the mills as rapidly as is possible. The whole situation is heart-breaking to a lover of wildlife and trees. We have one refuge, Lassen National Park, where wildlife is unmolested. Thank God for that!

Acting on the recommendation of the State Game and Fish Division, Governor Elmer A. Benson of Minnesota ordered a closed season on bears in that State this spring. Surveys showed the bear population to be in serious danger of depletion. The season will be open this fall.

One of the immediate objectives of the Texas Federation of Nature Clubs is to obtain reasonable and practicable control of oil well operations in the river, bay and Gulf waters of that State. Wells are now being drilled—and other spots are marked for drilling—in submerged lands along the coast, a region in which large numbers of birds make their homes either as residents or migrants. The inevitable blowout of a well, spewing thousands of barrels of oil on the surface of the water to be carried hundreds of miles by wind and tide, is a constant menace to water birds, and all marine life. *The Dallas Morning News* joins conservationists in calling upon the Texas Game, Fish and Oyster Commission to act, declaring that: "Texas wildlife belongs to all the people. This highly valuable resource must not be destroyed unnecessarily because of the conflicting interest of a small group."

Woman's Tongue Tree

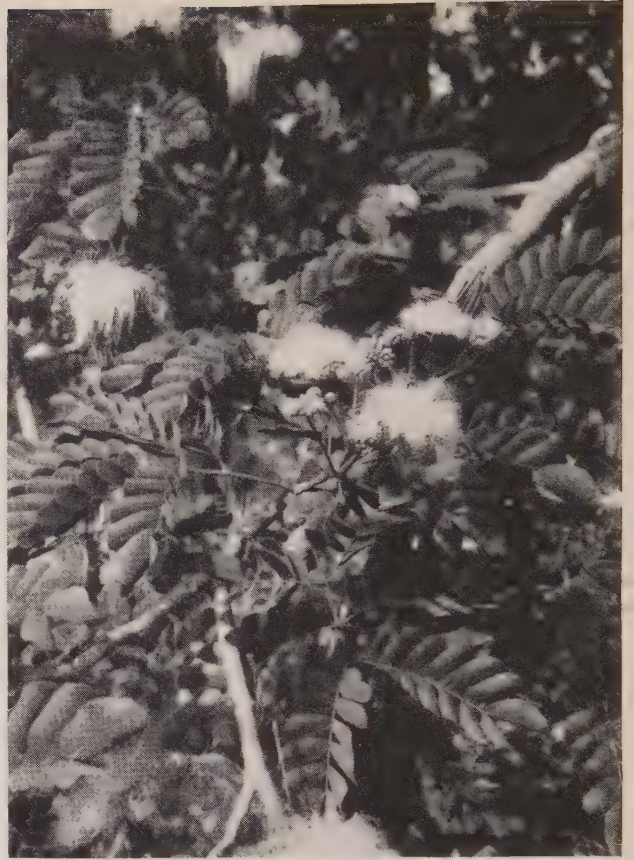
By HUGO H. SCHRODER

A PECULIARLY sweet odor calls our attention to a strange tropical tree blossoming in Florida in late spring and early summer. This is the woman's tongue tree, *Albizia lebbek*, a native of tropical Asia that frequently is used for street and ornamental planting, as well as for dooryard shade, in central and southern Florida. The tree received its generic name in honor of Albizzi, an Italian naturalist.

Examination of the flowering tree reveals countless greenish-yellow blossoms, borne in globular heads. When the flowers open, they have the appearance of a small feather-duster for a short period, then droop into a rather bedraggled mass before dropping. New flowers follow as the old ones wither, and the tree may have a blossoming period of two to four weeks. During the summer months, the fully foliated tree is appreciated for its shade.

Clusters of flat seed pods, from five to eight inches long, develop after the blossoms disappear, and most of these remain on the tree until the following spring. Most trees that shed their leaves do so during the colder months of fall and winter, but *A. lebbek* is strangely different. It remains covered with foliage until spring, when suddenly all the leaves are dropped and only the dry seed pods remain to rattle against each other as the wind sets them in motion. This may have been responsible for application of "woman's tongue" as the common name for this tree.

When the sudden defoliation takes place, one wonders if the tree is about to die, but after a short dormant period



THE WOMAN'S TONGUE TREE

Possibly so named from the rattling of the seed pods in a passing breeze. Here are shown the blossoms and bud clusters

it produces a new crop of leaves, and then the strange blossoms make their presence known by their fragrance. Dry seed pods, new green leaves and a multitude of blossoms adorn the tree in the spring.



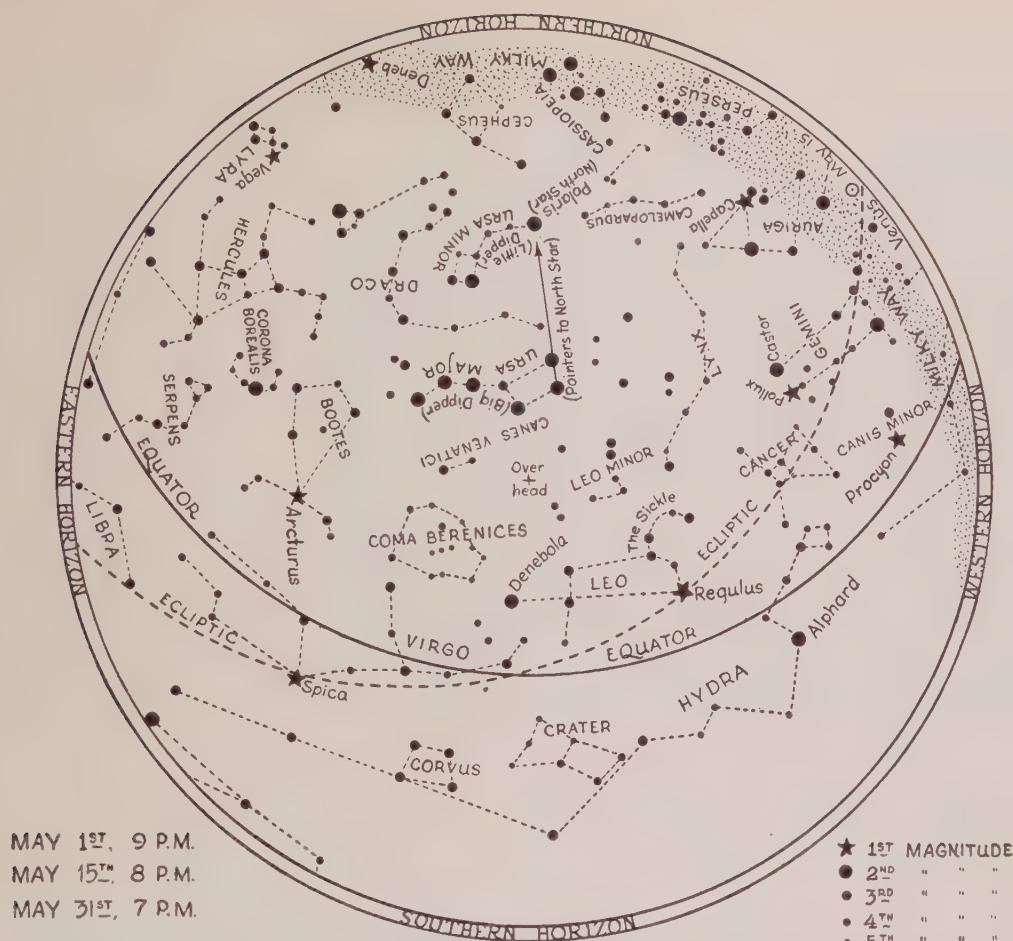
A Solid, if Not Toothsome, Plateful

By GEORGE A. SMITH

COLLECTING stones that look like articles of food may become a fascinating hobby. It has its profits, too, because it has the power to lure its followers out into the wide open places of Nature, the fresh air and sunshine.

The collection illustrated represents many hours of enjoyment gained from tramps afield, with by-products of new experiences, a better appetite and a greater joy in living.

To be found on the plate, without too wide a stretch of the imagination, are a bun, an asparagus tip, a piece of cheese, a potato, a prune, a pea, a lima bean and a peach.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

MOON TO BE ECLIPSED IN MAY

By ISABEL M. LEWIS

ONE of the outstanding celestial events of the year will be the total eclipse of the moon on May 14.

The eclipse will be visible, wholly or in part, in the United States and over all of the western hemisphere, except the extreme northeastern part of North America. It will also be visible in part of the Atlantic Ocean, in Antarctica, the Pacific Ocean, Australia, and the northeastern extremity of Asia.

In the eastern states the sun will rise before the moon has completely left the earth's shadow, so that the moon will set partly eclipsed at sunrise, although the total phase of the eclipse will be visible in all parts of the country. In Eastern Standard Time the moon will enter the umbral shadow of the earth at 1:57 A.M., May 14, and the partial phase of the eclipse will then begin. The earth's shadow will be seen creeping gradually across the face of the moon until, at 3:18 A.M., it will be completely immersed in the shadow, and the total phase of the eclipse will begin. This will last for fifty-one minutes until 4:09 A.M. when the moon will begin to emerge from the shadow of the earth and will

leave it completely at 5:31 A.M. This will be after sunrise in the eastern part of the country. At Washington the sun will rise at 4:56 A.M., Standard Time, and the moon will set partially eclipsed in the west at the same time. In the central and western states, however, the moon will leave the earth's umbra before sunrise. All the phases will occur one hour earlier, respectively, in Central Time; two hours earlier in Mountain Time; and three hours earlier in Pacific Time. At San Francisco, for example, the moon will enter the earth's shadow at 10:57 P.M., May 13. Total eclipse will begin at 12:18 A.M., May 14, and will be over at 1:09 A.M. The moon will leave the shadow at 2:31 A.M.

The most remarkable fact about a total eclipse of the moon is that the moon remains visible, even when in total eclipse, shining with a weird, coppery light. The source of this light is, chiefly, sunlight shining through the earth's atmosphere surrounding the dark disk of the earth, as viewed from the moon, in the form of a brilliant ring of light several hundred miles in width. Just above the earth's surface this ring of light is reddish

in color, because, in passing through dense layers of atmosphere close to the earth's surface, the rays of short wave lengths are scattered and rays of the longer wave lengths—the yellow and red rays—predominate. These rays are deflected into the earth's shadow and fall upon the moon's surface, giving it its strange, coppery color.

The light of the moon during different eclipses varies considerably in color and brightness. This is due to changes in conditions of the earth's atmosphere within the ring of light between one eclipse and another. This light comes from the atmosphere in regions above the earth's surface where the sun is rising or setting at the time of the total lunar eclipse. If there should be dense clouds or storms, shutting off the rays of the sun in these regions at the time of the eclipse, the moon would appear darker during the total eclipse than it would if a clear and transparent atmosphere transmitted more of the rays of the sun. In addition to the light from the lower atmosphere of the earth, there is the light reaching the lunar surface from the upper regions of the earth's atmosphere where the auroral streamers originate. These streamers are produced by the bombardment of the atmosphere by electrified particles from the sun, and this light also is variable and associated with the sunspot cycle. It is a fact, then, that we see in the appearance of the moon during its total eclipse a reflection of atmospheric conditions on our own planet in the regions where the sun is rising or setting at the time of the eclipse. In this eclipse, conditions in the north polar regions, the Atlantic Ocean, and the western Pacific, would affect the brightness and color of the eclipsed moon.

A total eclipse of the moon can occur only when the moon is full for it is only then that the earth can come directly between sun and moon, and cast its shadow over the moon. The shadow of the earth is so great in diameter that the moon can be completely immersed in it for as long as one hour and forty-four minutes under the most favorable circumstances. Compare this with the seven and one half minutes maximum duration of a total solar eclipse, which occurs only once in many centuries! A total lunar eclipse of approximately *one hour and forty-four minutes* duration may occur a number of times in a century. Although total eclipses of the sun are actually more frequent than total eclipses of the moon—some years have two eclipses of the sun and none of the moon—they are rare occurrences in any one locality. Total eclipses of the moon, however, are quite frequently observed because each eclipse may be seen from *more than half* of the earth's surface. The rotation of the earth during the eclipse period brings additional regions of the earth into view of the moon, during the time that it is totally eclipsed and at any one time the moon is visible from half of the surface of the earth.

The scientific value of a total lunar eclipse is small, while that of a total eclipse of the sun is great, since it affords a rare opportunity to make certain observations of great importance in the solution of a number of problems in solar physics. One scientific observation that may be made during a total lunar eclipse is that of the drop of temperature of the lunar surface in the course of the eclipse and the rate at which it radiates into space the heat that it has received from the sun when the shadow of the earth falls upon it. Since it lacks an atmosphere the moon rapidly radiates the heat that it has received into space, and the loss of heat by radiation during the eclipse is great.

Another effect of the absence of an atmosphere on the moon is the visibility of the stars and of the solar corona in daylight. On this planet we may see the solar corona only when the sun is covered by the moon at the time of a total solar eclipse. On the moon at the time of a total lunar eclipse there is visible a total eclipse of the sun by the earth, and since the diameter of the earth is four times that of the moon the earth's disk at that time covers up not only the surface of the sun but also its solar prominences and all of the solar corona except its outer streamers. On the other hand, there is observable from the moon during the total lunar eclipse the beautiful and brilliantly colored ring of light surrounding the earth that lights up the moon with the coppery hue that we observe from the earth during the total eclipse of the moon. It is probable also that the dark side of the earth, as seen from the moon at this time, appears faintly illuminated and is visibly rotating on its axis. What would our earth-bound astronomers not give to observe such a celestial phenomenon, not for a mere three or four minutes, the duration of an average total solar eclipse on earth, but for as long as one and three-fourths hours at a time, on favorable occasions! What might be learned in such time is an alluring thought.

There is also to be a total eclipse of the sun this month but this will occur on May 29 in the far southern part of the Atlantic Ocean. The maximum duration will be four minutes and four seconds and the South Orkney and South Georgia Islands will lie within the path. Partial phases of the eclipse will be visible in the southern part of South America, the South Atlantic and the southern tip of South Africa.

Mercury will be at greatest elongation west in the morning sky on May 19, but this is not a favorable elongation to observe the planet, as it is too low in the east. Venus is now a fine evening star and will be in conjunction with Mars on May 8. The two planets will be only two minutes of arc apart and the two will form a most interesting double star in appearance. One should observe them with binoculars. Jupiter is now a brilliant object in the morning sky but Saturn, also in the morning sky, is too low in the east to be seen to advantage.

TEACHERS!

Why not a bird-banding project in connection with your Nature-study class?

By PAUL M. DELLER



BANDING of small migratory birds in America is beginning to receive more attention and is becoming more popular throughout the country. Until a few years ago, this work, which is carried on here and in Canada by volunteer cooperators under the supervision of the United States Biological Survey, was not publicized to any great extent.

Bird-banding, defined, is the trapping and placing of small aluminum bands on the legs of migratory birds of all sorts for the purpose of studying the migration habits of the species captured. On the bands are serial numbers and the abbreviation "Biol-Surv." Records of birds banded and freed are kept both by the cooperator and by the Survey at Washington. Should a bird banded in one locality be trapped in another miles distant, he is rebanded, recorded and set free. Should the bird be found dead, the band is read and recorded and the information is, or should be, forwarded to Washington. Therefore, when thousands of such migratory bird-histories are recorded, man learns more about the travel habits of his feathered friends.

Such a project is valuable in connection with Nature-study classes in schools since it permits a closer approach to the subject than is possible with a camera or binoculars, and thus arouses the interest of the students.

A necessary prerequisite to this project is the application, by the sponsor, for a Federal bird-banding permit. This allows him legally to trap and band migratory, non-game birds. The next step is to apply to the state fish and game department for the state permit, which is almost always granted. The former permit is granted only to those who have a general knowledge of birds, and can comply with certain other requirements.

When the necessary permits have been obtained, the person becomes a "Federal Bird Bander." Along with his permit he will receive a banding manual that describes

the work expected of him, and necessary record blanks also are provided. The bander, however, must furnish certain small accessories, that need not be expensive, including the trap for capturing the birds. The project can be begun in spring or fall, and will be equally as successful on the grounds of a large city school in the heart of a busy metropolis as it will be in rural sections. The traps, placed within sight of the classroom windows, if possible, should be surrounded by a low, mesh-wire fence to discourage the curiosity of dogs or cats. Bait the traps either with food suggested by the banding manual, or with those foods found to be best by the trial and error method. "Live Water," which is dripping water pattering rhythmically into a shallow pan, is practically an irresistible temptation to the birds.

A project of this kind is valuable when undertaken in connection with a school Nature-study course. It will awaken in the older child, who already senses the value of birds, a broader understanding of them. The sponsor-bander can show students who gather about him, at a safe distance from the trapping grounds, the markings, colors and other distinctive characteristics of the various species he will handle and band. Responsible students who show particular interest can help collect the birds in "gathering cages" preliminary to banding them. Many minor duties, besides construction of traps, include research work through books and pamphlets, and general study of the "returns" as issued by the Biological Survey. If it is desired to carry the projects along for a number of years, a program of colored banding may be adopted. This is used for a variety of purposes. Banding entire broods and determining the percentage of return the following spring, or studies in individual behavior of certain species, can be done by color banding. The actual banding operation, remember, should be performed only by the person holding the permit, and in no instance

should the privilege be abused, in this way or otherwise.

Banding and handling of birds does not discourage them from nesting in the community, nor does it seem to interrupt their routine life. In fact, the reverse is generally true, and many times a bird may become almost a nuisance as it continues to return to the traps for water, or food that is especially palatable. During the winter, especially in those localities where birds linger late into the season, the project can be carried on in a smaller but even more interesting manner. A window-sill trap is installed, and nearby a shelter station of some kind con-

structed. Bait for these winter traps should include suet, meat scraps, ground nutmeats and raisins. In this case the banding can be done in the classroom, before the pupils. The birds should be banded and released by the bander with a minimum of handling.

Fused with such a school banding program should be interesting lectures and an occasional classroom motion picture showing bird life in general. The author has used the project suggested here almost in its entirety. It has proved to be a worthwhile addition to his Nature study course and it has been most popular with the classes.



Menelik's Bushbuck

By ERNST SCHWARZ

THE bushbucks are among those antelopes that are most widely distributed in Africa. They are found wherever there is brush or forest, living singly or in pairs, never herding together in troops. The males have short horns with a spiral twist and a keel along the anterior edges, but the females are hornless. Most bushbucks have beautiful white markings, spots, transverse and longitudinal stripes, especially the females and the young. They are, therefore, also known as harnessed antelopes. It is interesting to know that bushbucks inhabiting mountainous country, as in Abyssinia and Kenya, are larger and have longer and more strongly-twisted horns, compared with the smaller ones of the low country, with shorter and straighter horns. These antelopes are frequently hunt-

ed for their horns, which make fine trophies, and also for their venison, said to be the best of all African game.

Bushbucks are related to the kudu, eland, and all the other screw-horned antelopes of Africa; and they are also not far removed from the cattle group. The males have a tendency to become dark when adult, whereas the females remain reddish-brown. Their near relatives, the elands, have a dewlap like cattle, thus emphasizing the close relationship of the two groups.

The animal shown in the photograph represents a male of the Abyssinian highland race known as Menelik's bushbuck. This is one of the large types with strong horns, and is characterized by its deep sepia color and the absence of white stripes in both the male and the female.

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THE BIRD THAT ADOPTED MICHIGAN

(Continued from page 302)

manner—came at 6:15 in the morning. Not knowing then what it was, we called it the "ghost bird." We saw it when we returned a few days later, whistling as it flew, so far away it could be seen only with glasses, yet the song was loud and apparently nearby. Little wonder we did not see it the first time. The individuals we saw along the highway made no sound.

"Travel all that distance just to see a bird?" "Yes, and *what* a bird!" we answered the scoffers. Even without such side-trips as to watch the prairie chickens dance, to see the most southern goshawk nest on record in the state, my first clay-colored sparrow, and to glimpse other more or less common birds, the Kirtland warblers, on their nesting ground, give one a thrill that all bird-seekers know. Pursuit, conquest, triumph, beauty, fresh air, relaxation, companionship; they are all a part of the chase.

INDOORS AND OUT

(Continued from page 263)

fashion) is from the best of Emerson's poems, a sustained apostrophe to Spring, entitled "May-Day."

For timely enjoyment and profit I can think of nothing better than this May-Day poem. Its graphic phrases alone have value enough, descriptions not only of sights but sounds and smells.

*Was it a squirrel's pettish bark,
Or clarionet of jay? or bark
Where yon wedged line the Nestor leads,
Steering north with raucous cry
Through tracts and provinces of sky.*

*The perfumed berry on the spray
Smacks of faint memories far away.*

The ground-pine's rusty green, the maple top's crimson tint, the joyful blaze of tulips,

*Frog and lizard in holiday coats,
And turtle brave in his golden spots,*

the ten-tongued laurel, and other specific delights occur throughout the poem.

I count more than forty specific references, in addition to the generalities of trees, hills, streams, and the like.

I take delight in such happy phrasings as—

*I saw the bud-crowned Spring go forth
Stepping daily onward north.*

And my pleasure in things seasonal finds infinite satisfaction in the closing apostrophe to Spring, which—

*In city or in solitude,
Step by step, lifts bad to good,
Without halting, without rest,
Lifting Better up to Best;
Planting seeds of knowledge pure,
Through earth to ripen, through heaven endure.*

John Jay Chapman wrote that many people do not enjoy Emerson's poetry because "they fail to find fire in the ice." Yet I remember that John Muir wrote: "During my first years in the Sierra I was ever calling on everybody within reach to admire them, but I found no one half warm enough until Emerson came." And I think that those who do not feel the warmth in these poems have not come close enough.

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What About This Summer?

This is the time of year when we are all looking forward to what we shall do for the summer vacation, even though spring has not as yet left us entirely. In this spirit this page is taking a vacation from its usual practice of outlining a field of study and is instead pointing out some types of work in natural history that may be done during the summer months either by adults or by children. The suggestions are restricted to what is being done through organized summer camps and summer schools.

Summer Camps

A recent survey of 184 camps serving 11,782 boys, 5,780 girls and 1,575 adults showed that, while these camps make much of the fact that they recognize a value in bringing their campers into the open for a period, they do not always recognize an obligation to provide guidance in instructing the campers in the ways of the wild. It is true that 89 percent of the camps surveyed employed Nature counsellors, but in these camps 258 leaders were employed to instruct 19,137 campers and this number hardly seems adequate. It is certain that in many camps, such as the Audubon Camp in Maine and the Yosemite School in California, criticisms of this sort are not just, but there are many camps where little provision is made for Nature leadership. One cannot assume that because an adult or a child goes to a summer camp he comes back with as much Nature lore as he should have.

In only 76 of the 184 camps surveyed was any instruction in conservation given, and in all but one of these 76 the work was given as a part of the Nature work. In only 82 of the 184 camps were the camp grounds treated through the year as wild life refuges. When one recognizes that these camps, ranging from a 4-acre camp to one of 20,000, control a total of 57,660 acres, it seems unfortunate that all camps cannot be enlisted to preserve for use by their campers during the usual 8½ weeks of the summer season the wild life that would naturally be supported on them.

The directors of these camps ranked certain interests as to their importance, and this action may provide a clue for understanding why more emphasis is not given to this work in these splendidly located open-air schools. In order of importance, these directors gave first place to health. This was followed in turn by athletics, woodcraft, handicraft, Nature study, music, conservation and fine arts. It should be apparent from this that anyone wishing training in conservation and natural history in summer camps would need to investigate the staff, programs, equipment and record of any camp to be attended. The merit of a camp is not determined, apparently, by the size of its fee or the number of campers in attendance. Probably the directors are sensitive to the wishes of any considerable proportion of the campers and any concerted effort to insist that greater emphasis be given Nature work would be heeded. Here, then, is a chance for us to do missionary work of

a truly worthwhile sort. This may well be done at the time a decision is being made as to which camp will be attended. If every prospective summer camper in America asked every camp director to prove that his camp site was a wild life sanctuary, and that appropriate recognition was given in the program and on the staff for instruction in field natural history, great strides would be made in improving this important field of instruction.

One cannot here go into details regarding the qualifications of good Nature counsellors except to say that they are not necessarily the same as those for a good classroom teacher. Neither can they be met by overnight cramming. One young woman who had been appointed a Nature counsellor in a large camp recently wrote asking that she be told in a letter how to handle the job. Her only qualifications were that she had for four years been successful as a hockey counsellor. Another young woman who had been appointed a Nature counsellor, when asked how a song sparrow looked, said she did not know, but was taking a course in botany and expected to learn about it there. In spite of these instances, there are some of the finest teachers of field natural history in our summer camps. Many of them have had little work in graduate schools of natural history. Few of them have Ph.D.'s, but all of them have had long experience and a real interest in this field. Ordinarily they need little or none of the equipment that clutters the college laboratory, and the best of them may get along well with small libraries. Their service demands more than many branches that are more adequately rewarded, but their service to wild life conservation and human happiness are valuable, and would seem to merit rewards in keeping with their worth.

Summer Schools

Just as one cannot generalize on what is going on in summer camps, so one cannot safely say that all summer school offerings in field natural history of interest to the Nature lover are equal in value.

While most summer sessions of our colleges offer regular courses in natural history, not all of them handle the problem of instructing teachers in field natural history in the same way. It would seem from announcements available that one popular procedure is to house the students in modern hotels and provide field guides on a regular plan of instruction. Such a course is offered at Columbia University from June 6 to July 1. Somewhat similar offerings are made by the West Coast School of Nature Study through San Jose State College in California from June 18 to July 2.

The University of Colorado and a number of others offer field courses with headquarters in a permanent camp site. At Pennsylvania State College, under the leadership of Professor G. R. Green, and at the Allegany School of Natural History working through the University of Buffalo, the students live in permanent cabins around centrally located laboratories and mess halls, and get their

instruction rather intensively. At the Pennsylvania school, there are two three-week sessions, and at the New York school, a single longer session. In each case the major part of the instruction is in the field.

A somewhat similar program is being developed at Massachusetts State College under the leadership of Dr. W. G. Vinal and others of the staff at that institution. Undoubtedly this will emphasize some of Dr. Vinal's philosophy, which combines Nature and recreational leadership.

At Cornell University, where Nature study has been a summer school offering for teachers almost continuously since 1899, there will be a field course for teachers. The students will live in their own sleeping bags, "roughing it" for twelve days of the summer session, and combining this with regular campus instruction during the earlier part of the week. Being foot-free, the students will spend one week studying the life of Cayuga Lake with a cruiser as a home, and geologists and a limnologist as leaders. Another period will be spent in a highland forest with a forester and a soil erosion expert, and so on through other fields of endeavor.

Of course an abundance of schools will offer regular campus courses in field natural history suitable for teachers' use. In the northwest such a course will again be offered at the University of Washington, this particular course being sponsored by various groups that offer tuition scholarships to qualified candidates.

Many schools located during the major part of the year in regions that may be uncomfortable in the summer months hold their field courses in more pleasant surroundings. This is done at the Fresno, California, State College, and at other places.

Many field biological stations offer work in natural history that may be suitable to Nature teachers. Some of these, where the memory of Agassiz is honored, forget that his school at Penikese was planned to meet the needs of many who were teaching below the college level. Some of these stations are most expensively equipped, splendidly manned and poorly attended. Some of them fail woefully to practice the principles of wild life conservation, and for this reason it may be fortunate that they are not better attended. They miss an opportunity for a service that they do not recognize. With intelligent management this service to teachers could be given without seriously impairing the work already being done in this or other departments.

Scholarships for Summer Work

While scholarships in summer sessions are a part of the offerings of a number of institutions, it may not be well known that there are a number of scholarships sponsored by the American Nature Study Society. These may be used in any institution approved by the scholarship committee of the Society. Applications for these should be made to the secretary of the Society, Miss Nellie Matlock, 5540 Pershing Avenue, St. Louis, Missouri.

★

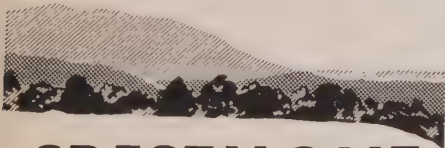
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On Ferns

In 1901 *Our Ferns and Their Haunts* by Willard N. Clute was published and served as a valuable book in a most limited bibliography in this field. Now the original has been completely revised and amplified, and, indeed, retitled, being now known simply as *Our Ferns*. This volume will be, we are certain, enthusiastically received among lovers of flowers and ferns because it fills a definite need. Mr. Clute, its author, is editor of *The American Botanist*. As a guide to native ferns, this volume applies primarily to those forms found east of the Rockies and north of the Gulf States. Ferns of other regions are touched upon but not as extensively. The book is liberally illustrated with full color, line and halftone illustrations. It is published by Stokes and sells for four dollars.

Cornell Leaflet

Electricity and Magnetism is the title of the latest Cornell Rural School Leaflet—Volume 31, Number 4—to come from Dr. E. Laurence Palmer, Professor of Rural Education.

A Nuthatch Drinks

by Dorothy W. S. Coffin

Have you ever wondered how small birds get a drink in winter-time? I had never really thought about it till I had a living illustration one snowy morning last January. Outside my bedroom window there is a feeding tray for birds, its glass roof covered by green pine boughs. The night before, the snow had rounded-over the little thatched roof and from the tip of a low-hanging feathery branch hung an icicle, glistening in the sunlight. And there, his tiny feet clinging to the bar at the front of the seed tray, stood our pet red-breasted nuthatch, his head bent back and his beak open to receive the drop from the end of the icicle. What a picture! Oh, that a camera had been in my hands instead of a mop!

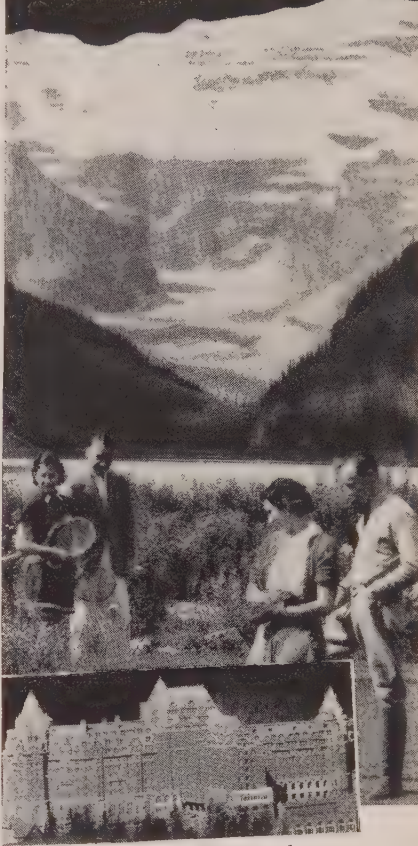
Want to Exchange?

Another butterfly and moth collector who would like to get in touch with others of similar mind with a view to exchange of specimens and information is M. C. Brackelsberg, 514 10th Avenue, East, Duluth, Minnesota.

High School Biology

Covering the field of biology with a view to preparing students for college entrance examinations in this subject, *High School Biology*, by Ralph C. Benedict, Warren W. Knox and George K. Stone, is an excellent addition to school texts in this field. Not only does the text provide a logical development of the subject and emphasize the inter-relationships of the various sciences, but it also interprets the significance of biological knowledge in the social sense. With an accompanying guide to high school biology by Edna Craig and Mr. Stone, we have a well-rounded teaching medium. Both the book and the guide are published by Macmillan and are listed at two dollars, and ninety-six cents, respectively.

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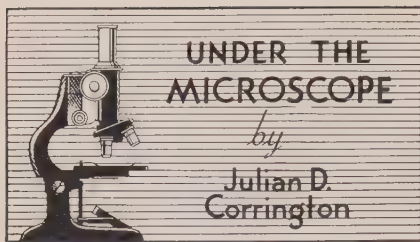
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The World of Diatoms

This department is now entering its tenth month and has demonstrated unheard-of restraint in holding off this long before introducing the reader to diatoms. For these microscopic one-celled plants, almost from the time of their discovery by O. F. Mueller, in the latter half of the eighteenth century, have been the unrivaled favorites of amateur microscopists the world over.

Such popularity must be deserved, and a glance at our illustrations will reveal some of the reasons. Diatoms are minute and require moderately high power for examination—hence they lie entirely within the domain of the microscope. They exhibit unique beauty of form and symmetry, with intricate patterns of markings in endless variety. They are legion in number of both species and individuals. They occur wherever there is or was water, both fresh and salt, past or present. In several remarkably diverse ways they are of considerable economic importance.

Many separate articles and whole volumes have been written upon this great group, and we can do no more than introduce the subject within the limits of a single installment, reserving details for further consideration later on. Diatoms constitute an order, the Diatomaceae, Diatomales or Bacillariales (different authors use different names) of the class Chlorophyceae or green algae, the same class that includes also the confervas, pond scums, desmids, siphon algae and stone-works. Most of this great assemblage of lower plants remained unfamiliar to the general public until the tropical fish craze necessitated the learning of names and habits of those green algae used in making the balanced aquarium.

The word diatom is from the Greek, meaning cut in two, and refers to the unique structural character by which members of this order are distinguished from all other organisms—the cell walls are filled with silica to make a hard and rigid box that persists as a skeleton after death of the protoplast; each such box is a *frustule*, and is composed of two halves, the *valves*, which fit together by means of an overlapping edge, the *girdle*. This construction has been frequently likened to that of a pill box.

Another structural item of importance in classification is the *raphe*; when present, this is a longitudinal slit in the shell permitting communication between the living protoplast within and the water surroundings outside. Some diatoms, particularly the boat-shaped *Navicula*, may be seen to glide back and forth in a water mount of fresh material, without visible means of propulsion. Years were to pass before scientists were finally able to demonstrate the presence of minute cilia in these forms. Diatoms reproduce by either conjugation or spore formation. Most of them are free and independent cells, but in some species they form colonies, united in various ways, or grow embedded in a gelatinous mass.



A CIRCLE SLIDE OF DIATOMS SHOWING THE GREAT BEAUTY AND VARIETY OF THESE MICROSCOPIC PLANTS

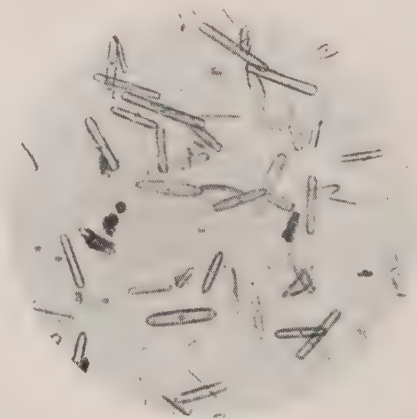
The order is divided into two suborders: the Centricae, in which the valve markings are radial, like spokes in a wheel, and the Pennatae, where the markings are pinnate,—that is, coming off in two parallel series on either side of a midrib, as the barbs on a feather. To these markings attaches the chief interest, owing to their symmetry and great intricacy of design and detail. In color, a few living species are green, like other members of the Chlorophyceae; but most diatoms are brown, ochre or amber, due to the presence of a yellowish pigment, diatomin. The valves are colorless, but often exhibit brilliant coloration in slide mounts because of interference with transmitted light rays. Shapes vary from circular and elliptical through wedges and triangles to rhombs and needles. Frequently the shape as seen from the valve view may be very different from

the girdle view of the same individual.

More than ten thousand species of diatoms have been described, of which some fourteen hundred occur in North America. They are found in all aquatic situations, from the ocean to the smallest pond. They form the largest item in the plankton—that assembly of floating organisms that constitutes a veritable mat of invisible life on the waters' surface—and also exist in enormous numbers on the bottom, where they cover soil, rocks, submerged timber and such other forms of life as large algae, corals and shells.

They may be collected with a plankton net from the first type of situation, and by taking scrapings from the second. One diatomaniac—as the diatomists sometimes call themselves—recommends using an old piece of photographic film as a scraper, going gently over the surface of underwater pilings, mud bottoms, sea weeds, rocks and shells so as to skim off the rich coating of these ubiquitous algae.

The siliceous shells resist solution by water, being in fact well nigh indestructible, and when the diatom plant dies the frustule falls to the bottom, there to accumulate in vast numbers through the years. So long has this process gone on in certain places of the earth that great deposits have piled up, known as siliceous or diatomaceous earth or kieselguhr, also incorrectly as infusorial earth, a name applied before the correct nature and relationships of the diatoms had been established. Extensive strata of this earth, consisting largely of diatom skeletons, are found in Hanover, Scandinavia, Scotland, Australia and various sites in the United States, such as the well-known deposit at Richmond, Virginia. This is thirty feet thick and of vast extent. One great find



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EVINRUDE LAWN-BOY

in the Rocky Mountains is more than three hundred feet in thickness. Ehrenberg once estimated that a formation at Biln, Bohemia, contained forty million diatom shells per cubic inch!

Because of its abrasive properties and the fact that diatomaceous earth will absorb more fluid than any other known material, it has found many and varied industrial uses, among which may be mentioned that of an absorptive vehicle for nitroglycerin in the manufacture of dynamite; in fluid disinfectants; for packing corrosive liquids; as a non-conductive substance for packing steam pipes; and as a polishing medium in scouring powders and pastes and soaps. The hobbyist can make slide mounts of diatoms found in silver polish and tooth powder.

Diatoms are the jewels of the miniature world and it is not surprising to find, therefore, that designers of textile and other patterned materials have turned to this great group for inspiration when other sources seemed exhausted.

A much more important utility for these plants, however, comes directly from our own field—that of microscopy. So hotly have disputes raged in the past as to the exact details of diatom construction that specialists in this study demanded better lenses during the past century and should receive much of the credit for the present high state of development of microscope objectives and condensers. Today, certain favorite and intricately marked species, known as "test diatoms," are in constant use in examining and testing lenses at the factory and by research experts in optical science.

Of still greater basic though indirect value to man is the service of diatoms in providing the fundamental food source of aquatic animals. For diatoms, as all green plants, manufacture starch from inorganic components and thus initiate a food cycle passing through such microscopic organisms as protozoa, rotifers, worms and crustacea, to larger invertebrates and fish fry and minnows, and to the larger fish of great commercial importance. The next time you partake of a choice bit of salmon or mackerel, recall that you are eating animal protoplasm the original energy of which was captured from the sun ages ago by countless diatoms!

Beginner's Primer

You may collect your own diatoms, as per suggestions in the preceding article, and try to mount them according to instructions given in the advanced hints below. Or you may prefer to collect and study prepared slides, obtainable from a number of supply houses, in which case the following classification of diatom slides is worth studying.

1. Life mount. The diatom cell is here treated as any other interesting type of microscopic organism, the protoplast and nucleus being stained to bring out full structural detail of the living parts of the plant, and the shell ignored. Biologists and botanists are mainly concerned with this form of slide.
2. Strew or spread slides, the specimens scattered over the field and not arranged in any particular order or design. In this and all following classifications, the cleaned shells only are mounted, the living parts removed. Primarily of interest to diatomists, hobbyists and collectors. Subdivided into two kinds:
 - a. Species strews; all the specimens of a

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single species, from the same or different localities, for comparison.

- b. Locality strews; the several species from a given locality on a single slide; for collections and for distributional studies.
3. Type slides have one each of many different diatoms arranged in neat rows; accompanied by a key list giving the names. One of the most useful slides for beginners in learning diatoms; also good for collections.
4. Test slides, an arranged row of those forms most useful in testing microscope lenses for resolution. Maintained by all optical workers.
5. Circle slides. Miscellaneous different species arranged in the form of a solidly-filled-in circle; not identified. Primarily as objects of beauty and interest; to get many forms in a small space; and for photography. See illustration on page 312.
6. Exhibition slides, the masterpieces of the diatomaniac and one of the most beautiful of all objects for the microscope; selected, unnamed species arranged into symmetrical designs, as stars, crosses, and various complex geometrical patterns. Each cell must be separately placed with great care and precision, under magnification, and hence such slides are expensive.

Should one be interested in beginning the study of diatoms, we could recommend no better procedure than to purchase one each of these several kinds of slides as a nucleus, adding others, from time to time, by purchase, personal manufacture or by exchange with others whose chief hobby lies in this sphere.

Prize Contest Announcement

In response to a number of requests from readers, this Department is initiating a monthly contest for amateurs in photomicrography. For the present no definite subjects will be specified and contestants may submit prints of any material they wish. See our January issue for instructions in photomicrography. The following rules will apply:

1. All prints received during a given month will be considered as entered for the issue of the third month following. Prints received after the last day of each month go into the next contest.
2. The first of these competitions will be for the August issue, and will continue monthly thereafter, without necessarily any further announcement, until the series is terminated by due notice.
3. Prints must be glossy finish (all photographs for reproduction have to be of this type), but may be of any size. Better reproductions are possible, however, if a reduction can be made by the photo-engraver, and a 4 x 5 print or thereabouts is suggested as desirable, either contact print or enlargement.

4. Prints must be accompanied by full data: name and address of contestant; description of subject; make and model of microscope and camera, with specifications as to objectives, eyepieces, and whether or not lens of camera is used; type of illumination and description of any filters used; type of plate or film; length of exposure; and any other data you think of importance. These facts will be very useful to others.

Example:

Name: Janice Holcomb, 214 Smith Terrace, Westchester, N. Y.

Subject: Earthworm, stained cross section;

red. (Specify the stain or stains, if known.)

Microscope: Bausch & Lomb FB; objective, achromatic 16 mm; 10X eyepiece; magnification 100X.

Camera: Eastman Microdak, lens removed; Verichrome film.

Light: 100 watt blue Mazda; homemade orange filter; exposure 1 minute.

5. If return of prints is desired, they must be accompanied by stamped, addressed envelope, with correct postage, including allowance for any cardboard protection. Prints not so accompanied will not be returned, and we might suggest that since prints are so easily duplicated, such return is usually not worth while to the sender except as provided in item 6.

6. Those wishing criticism for purposes of future improvement should write "Please criticize" in addition to data called for in item 4, and provide envelope as per item 5. This service will be gladly rendered.

7. The winning photograph each month becomes the property of NATURE MAGAZINE. The sender will be awarded the prize of five dollars and will see his photograph published in the issue for which it was entered.

8. The five next best photographs submitted will be awarded Honorable Mention and the list of those winning this honor will be published. In case any of these prints are deemed worthy, NATURE MAGAZINE will purchase them at three dollars each and use them either in the specified issue or later.

9. Address all photographs for these contests to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., N. W., Washington, D. C., and mark the envelope "Photomicro contest."

Trade Notes

Every once in a while some new book appears that, because of the importance of its subject, or authors, or both, goes on the *must* list. For the microscopist, the book of the year and one that he simply *must* have is *Culture Methods for Invertebrate Animals*.

Here is a volume that was ordered written and bears the seal of official approval. The zoologists of America appointed a committee, headed by Professor Needham of Cornell as chairman; the committee then called for contributions, sorted, arranged and edited those sent in, and used or abstracted already published and standardized procedures. The result is a manual giving the teacher, researcher, student, amateur and hobbyist a collection of all the approved methods of culturing invertebrates.

Do you want to rear and keep *Daphnia* for the tropical fish aquarium; *Drosophila* for genetics experiments; *Amoeba* or *Paramecium* for work with the microscope? These are but samples from hundreds of entries. No one working with the collecting, rearing and care of invertebrate animals can afford to be without this book. Pp. xxxii, 590; 85 figs. Ithaca, N. Y., 1937, Comstock Publishing Co. \$4.00.

* * *

E. Leitz, Inc., 730 Fifth Ave., New York City, is out with a new catalog entitled *Microscopes*, and designated as Catalog VI-A. This volume consists of 132 pages and is beautifully printed and illustrated. Every form of microscope as well as such accessories

as lamps, micrometers, mechanical stages, camera lucidas, etc., are included, with some excellent introductory material on optics. Sent without charge only to those connected with institutions. Write Leitz direct.

* * *

Diatoms comprise but one of many chapters surveyed in a famous work, the *Fresh-water Biology* of Ward and Whipple—a cornerstone in the library of all who are interested in the microscopy of small forms of life found in our fresh waters. The distribution, activities, relationships and systematic keys, accompanied by 1547 illustrations, of all forms of both plant and animal life in this environment, make this 1111 page volume an encyclopedia for ready reference, never surpassed in a single work. John Wiley & Sons, Inc., 440 Fourth Ave., New York City. \$7.00.

* * *

Our department offering this month is *Spencer Medical Microscopes*, a twelve-page booklet describing the construction and explaining the operation of medium-priced Spencer instruments, such as are recommended for medical students. It is very handsomely illustrated, and whether or not you are interested in buying an instrument of this quality, you will enjoy the folder. Send a three-cent stamp to Julian D. Corrington, NATURE MAGAZINE, for your copy.

* * *

Word comes to Ye Ed from Bausch & Lomb that their advertisement in the February issue of NATURE MAGAZINE broke all records for number of inquiries received from ads in this magazine. Just between ourselves, advertisers compute inquiry cost, based on the number received in proportion to the cost of the advertisement. Bausch & Lomb go on to state that the inquiry cost in this case was lower than that of any other magazine carrying their amateur microscope advertising. They conclude:

"In our minds, this is a direct compliment to the interest shown by the readers of NATURE MAGAZINE in this Department." That's the stuff, fans! Every letter like this gives *Under the Microscope* a boost. This is your Department, so keep up the good work and always mention NATURE MAGAZINE in any correspondence with advertisers.

* * *

Requests for copies of *Microscope Record*, the British publication, a limited number of copies of which were offered in the April issue, came in so rapidly that the magazines were used up in ten days. These requests were handled in the order that the postman or the telegraph messenger brought them, and we were sorry to have to disappoint some readers. Also, and incidentally, if you haven't asked for a copy of *Microscope Equipment for the Amateur* just drop us a line. More copies are available.

* * *

Under the Microscope is a department of NATURE MAGAZINE designed for those readers interested in microscopy and maintains a service to render assistance with problems in this field. You are invited to take advantage of this service. Address all inquiries to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., N. W., Washington, D. C.

Sincerely,
JULIAN D. CORRINGTON.

Toledo Naturalists

Among the various interesting bird records to be found in the annual bulletin of the Toledo Naturalists' Association are reports on a study of chimney swifts by Miss A. A. Brandenburg, on the nesting of the great blue heron by John J. Stopplet, and on a study of bank swallows made by a Boy Scout troop under the leadership of Frederick R. Flickinger, scoutmaster and editor of the bulletin. A limited number of copies of this mimeographed publication are available from Mr. Flickinger, 2402 Putnam Street, Toledo, Ohio, at fifty cents.

Hoosier Nature Club

Miss Lucy Campbell is the president of the Nature Study Club of Indiana for 1938, and Miss Betty Roche, 2035 N. Meridian Street, Indianapolis, is secretary. Nature lovers in the vicinity of the Indiana capital who are not affiliated with this active group should remedy that situation right away and get in touch with Miss Roche. We regularly receive the club's printed bulletin, *Hoosier Outdoors*, and the program of the club always fills us with an urge to close the editorial desk and join up.

Rocky Mountain Birds

Birds of Rocky Mountain National Park is the title of a little booklet published by the Rocky Mountain Nature Association and compiled by H. R. Gregg, Park Naturalist. This is a check list of the resident and visiting birds and is not intended to be an identification aid. However a key to the summer birds is provided, as well as a suggested bibliography. Copies of the booklet are available from the Rocky Mountain Nature Association, Estes Park, Colorado, for fifty-five cents.

Whitley Forest

The Iowa Federation of Women's Clubs, long interested in conservation and reforestation, have begun plantings on a fifty-acre tract in Ahquabi State Park, a project made possible through the cooperation of the state planning board and the state conservation commission. Nature Magazine is particularly pleased to record the fact that the forest will be named in honor of Mrs. Francis E. Whitley, Conservation Chairman of the State Federation, who has devoted many years of her life to conservation. To date, more than a quarter million trees have been planted, and the area bids fair to become one of Iowa's most attractive recreation sections.

John Muir Honored

The annual meeting of the National Life Conservation Society held at the Waldorf Astoria in New York was dedicated this year to observance of the one hundredth anniversary of the birth of John Muir. One feature of the meeting was an address on National Parks by Dr. Harold C. Bryant, assistant director of the National Park Service. Mrs. Charles Cyrus Marshall is president of the Society.

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Wasps and Ants

Again proving that one does not need to go farther than one's own backyard to see that constant drama of Nature, Clara B. Fuhr of Macomb, Illinois, reports an ant and wasp incident. A parade of black ants was busily running up and down the stalk of a castor bean plant between the ground and the new buds. At one spot, however, there was a congestion that proved to be a blue wasp that seemed to have staked out a claim, and every ant that came too near was unceremoniously picked up and thrown away. Miss Fuhr says that she couldn't discover "whether those ants were killed or just humiliated", but there was no doubt that the wasp was the boss at that spot.

Correction

Through confusion we robbed Cyrus S. Perkins of San Diego, California, of credit for the two spider monkey pictures that illustrated Mr. Stott's article on these monkeys in the April issue. We had purchased the pictures from Mr. Perkins and had Mr. Stott work up an article to go with them through cooperation with the San Diego Zoo. We're mighty sorry, Mr. Perkins.

Defending the Garden

Experienced gardeners know that back of the seeming peace and serenity of a beautiful garden a constant war is being fought. Season in and season out, the battle to fend off hordes of destructive insects must be waged. This is a war that necessarily knows no truce—where no quarter can be given. The only successful defense is a militant offense against the forces of destruction. Insects must be destroyed if your flowers are to reach their fullest beauty. The cheapest and most economical method of combating aphids, leaf hopper, slugs, etc., is regular spraying with "Black Leaf 40" which is volatile and thus kills insects both by contact and by fumes.

Modern Dictionary

Compiled and edited by Bruce Overton, *Macmillan's Modern Dictionary* is a splendid desk-size volume comprising more than 100,000 words and phrases and based upon the choice of the most valuable vocabulary for business man, speaker, writer and general reader. Instead of falling back on appendices for special classifications such as proper names of individuals, geography and the like, or abbreviations and foreign phrases, these are handled alphabetically in this volume. This dictionary is available at three dollars for the edition without thumb-index and three and one-half dollars with thumb-index.

Diana Thomas's

DOG COLUMN



THE English bull-terrier has been, until quite recently, a prime favorite among the medium-sized breeds. He still is a high-ranker, but, as the apartment, urban and suburban, steadily replaces the house, smaller and handier types of dogs seem to be in demand.

He is, in fact, somewhat too ebullient and hefty a fellow for many persons. Some feel he is slightly too cumbersome a pet for the city, and even too much of a problem in the increasingly-less-rural countryside. The astonishing fecundity of the gasoline-station, the hot-dog wagon and the jazzy roadhouse (not to speak at all of the motor-filled roads) must, in the very nature of things, gradually eliminate originals such as my friend, the bull-terrier.

He still retains, nonetheless, as he should, a horde of devotees: admirers of his staunch and lovable qualities. He is always in the mood for play, can be trusted absolutely with children, and is an excellent watchman and guard. Amiable qualities, however, do not ensure perpetuation!

The original bullterrier was kept and bred for pit-fighting in the "good old days". In the pit his prowess against other dogs and against myriad rats was the subject of popular song and of terrific enthusiasm. Be-

cause of his valor and ability in that sphere, his value was appreciated among the "fancy", and attention was given to his breeding and development.

Today, if a fight is inevitable, he uses his old-time technique memorized from his progenitors: weaving before his adversary, teeth bared and neck bristling; uttering hair-raising growls and watching warily for the moment to seize the vulnerable spot on his opponent's throat, and, like the bulldog, never once losing that grip till his enemy is limp and "out".

However, though bred as a fighter and reared in the tradition of the "ring", it is curiously a fact that he is, again like the bulldog, one of the best-natured and even-tempered among all dogs, never seeking a fight, slower than most to take offense or accept a quarrel, and bearing extreme provocation with unflinching amiability.

The few I have known have all been lamb-like. One, especially, humorously named the Tough Guy, seemed incapable of any emotion except love—even to aggressors among his tribe who foolishly misjudged his gentleness for timidity. Not until (late in life) he sought, found and alone finished a marauding, sheep-destroying wolf, was he indeed considered capable of properly defending himself. This fellow desired nothing better than to insinuate him-



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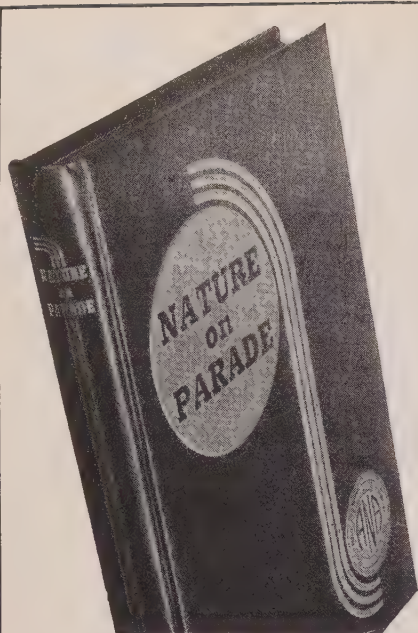
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self into a lap, roll his eyes at the fair owner of it, express heavenly content and (permitted to remain) lay his bulky white head on her bosom!

On a visit with me he was more incurably sentimental and slushy than ever, heaving huge sighs all over the place, spending much of his time in the most comfortable chairs (when a lap was not available) and licking all and sundry as long as they could bear it. We named him "Ganem, the Slave of Love"!

The late Cecil Alden, who in his last years devoted himself solely to the drawing of dogs, doted on bull-terriers. "Cracker", one of his models, was, until his death at an advanced age, the subject of many amusing pictures.

The admirable muscular formation of the bull-terrier, like that of the great Dane and greyhound, the latent power in it and the sleekness of his milky white coat is an everlasting joy to any lover of the beautiful. The baby pinkness of his ears and eyelids together with the twinkling jet black of his eyes gives an irresistible suggestion of clownish comicality.

He makes a perfect companion; staunch, loyal and centered in his affection, but, nonetheless, a completely sociable fellow, unlike other more strictly "one-man" breeds such as, for instance, the chow or the German shepherd. He is always ready for fun and has a strong sense of humor—a quality denied to a good many breeds.

The Chappel Award

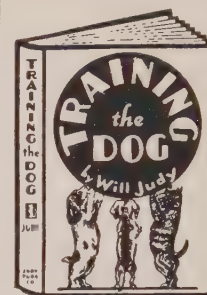
For more than twenty years Mrs. George Bethune Adams has served as manager and resident director of the Ellin Prince Speyer Hospital for animals in New York. Her long service to animals has been fittingly rewarded by the presentation to her of the 1937 Chappel Award for distinguished service to dogdom. In placing her name before the judges, a committee from the Dog Writers' Association said it was felt that the award should be made for "her unremitting work of day and night service to the relief of all animals, especially dogs; her courage and high sense of devotion to duty coupled with her continued and prolonged efforts toward a better understanding between dogs and their owners and the example she has set for others who work so that man's duty to all domestic animals in some better degree be met."

The Snowy Egret

Humphrey A. Olsen of 172 Manchester Street, Battle Creek, Michigan, has two major enthusiasms—birds and publishing. He has indulged the former by many years of field study and observation and the latter by reporting on these activities. For fifteen years he has been issuing occasionally *The Snowy Egret*, which, although in mimeographed form, contains a wealth of ornithological information and record. More recently he has been joined by his brother, R. E. Olsen, as co-editor, and by many bird lovers as contributors. The latest issue—Spring, 1938—contains fifty mimeographed pages and a wealth of data. We can't find a price, but think that it is fifty cents, sent to Mr. Olsen at the address above.

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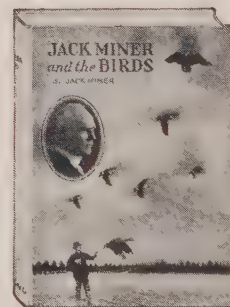
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A limited number of American Nature Association Bulletins of an early series are still available to members for a three-cent stamp each to cover the cost of mailing. These are:

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Solitary Confinement

"Put him in solitary!"

Those are dread words for a human being. They may send a man into a dark cell, there to spend his days brooding over his misspent life.

Uttered under certain circumstances, however, they may actually sound the beginning of a new life, or a new dynasty.

The "certain circumstances" are those to be found at any well-regulated flower breeding station. Solitary confinement cells there look very little like the rows of narrow chambers in a grim prison. In a wide field, dotted with colorful patches of zinnias, verbenas, snapdragon, petunia, larkspur, marigold and asters, there stand out from the brilliant scene a few white bag arrangements covering the tops of some of the plants.

These are solitary confinement cells in the flower world; but they look like miniature sailboats drifting on a sea of color. Flowers are imprisoned also in cages of cheesecloth stretched over a wood frame; and there are various other devices for making flowers and vegetables behave as seedsmen wish, once they have marked them for "solitary."

But suppose we look into one of the cloth bags. The flower it conceals certainly looks little like a criminal. Instead we find a delicate, beautifully tinted snapdragon. Is it a bad flower that had to be kept away from other snapdragons, or isn't it?

Decidedly not! It's an extremely good snapdragon. It happens that the reason for "incarcerating" flowers is quite different from the reason for sending men "up the river." Undesirable men are put in solitary confinement so they will not bother or harm their fellow men. But it is the unusually fine or interesting flowers that are locked up; and they are "jailed" that they may be protected from other flowers still "at liberty."

As explained by a breeder at a station of the Ferry-Morse Seed Breeding Institute in California, "solitary confinement" of flowers, or caging, as it is called, is an important phase of the seedsman's "pure lining process." Pure lining is the means by which the seedsman makes sure that the flowers he advertises as blue and frilled will be just that,—and not purple and straight edged.

"Seedsmen can't afford to have their seeds pulling Dr. Jekyll and Mr. Hyde acts," this breeder said. "A giant bedding, orange pink, rust resistant snapdragon that we produce must be all that its name implies. Fortunately, snapdragons can be better depended upon than old Dr. Jekyll could. When that gentleman locked himself in his laboratory he was no longer a gentleman, and he proceeded to drink himself into a Mr. Hyde. But when a snapdragon, or many another flower, is placed in 'solitary' it usually behaves as a discreet convict should."

The procedure of caging comes into play in several ways at the Ferry-Morse Institute stations. Each year many rows of flower trials are grown to observe the quality and uniformity of new and old strains. Alert seedsmen often espy, in the midst of several hundred flowers, one individual totally different from those about it, yet an individual entirely desirable in color, form, fragrance, habit of growth and other characteristics.

"That fellow goes into solitary confinement," says the seedsman to himself. The plant is then prepared for imprisonment; all the blooms are stripped from it. The cage is put in place, the cheesecloth covering ad-

mitting sunlight and air, but keeping out all pollen, whether wind or insect borne.

New blooms develop under the bag, and when they open the seedsman assists by hand those that are difficult to become pollinated naturally. Pollen is dusted on the stigma with a tiny brush. But, it is pollen taken from the anthers of that same plant! This plant, seedsmen say, has been "selfed." Selfing serves to retain and strengthen the characteristics exhibited by the plant while tending to exclude other undesirable characteristics.

The caged, selfed plant matures and produces seed which is carefully reaped, and sown in trial the following year. Seedsmen don't expect all the plants produced to look just like the prized ancestor from which the seed was reaped. But they find some well-behaved individuals appearing much like the parent plant. And for their good manners, these few fine individuals are thanked by being plunked into solitary confinement. Like father, like son!

But in a successful program of pure lining, each year sees more and more plants growing up gaily to display the excellent qualities of their granddaddy of several years ago. When a sufficiently high percentage of the plants show they have been disciplined long enough, by exhibiting faithfully the fine appearance and habits set up for this new strain, the item is ready for seed increase, and subsequent introduction to the gardening public.

Thus, a flower species is improved by the salutary influence of several years in the flower world's brig. Though the reasons for solitary confinement of flowers and men are different, the objective is the same—the improvement of society.

Flowers feel the "finger of the law" pointed at them, and find themselves headed for solitary for varying reasons. An individual decidedly different from his fellows, known to seedsmen as a sport, will probably land in the brig, as we have seen.

And then there are those select individuals who resemble their fellows, but are just a bit better. Seedsmen are interested just as much in keeping good flowers good, as in taking rare individuals and making them the progenitors of new and finer strains. So each year they grow trials of the flowers everyone likes. Seeing eight or ten individuals that express more beautifully and more exactly than others the qualities of the variety, the seedsman will "arrest" them, and have them caged. From this point on he will proceed as with any caged plant. But his result will be, not a new, novel flower strain, but a finer and truer strain of a well-established favorite.

Progressive seedsmen sometimes actually set about to create an individual they can send to a solitary cell. But that isn't as bad as it sounds. Assume that we have a yellow snapdragon with exceptionally large flowers, and an alluring, clear white snapdragon whose flowers are abnormally small. The seedsman wants to create a snapdragon with flowers the size of the yellow blooms and the color of the white.

He then cross-pollinizes, dusting the pollen of one onto the stigma of the other. The plant is protected from cross pollination from any other source and it is guarded until it has matured seed. The seed is planted to produce new individuals. In succeeding generations the seedsman may expect to find a few plants indicating capability to produce a large flower of a charming

white color. And he will show his appreciation for the flowers' cooperation by stripping them of their blossoms and putting them in cages. But once more, this seemingly ruthless treatment may add a worthy new member to the clan of snapdragons.

Plenty of humans never go to prison, and never see a solitary confinement cell. It's not to be assumed that none of them ever do anything deserving of censure; for many simply have the ability to discipline themselves.

And it is just so with some of our flower folk. The sweet pea, for instance, saves the flower breeder from inflicting solitary confinement upon it. The sweet pea blossom is so constructed by Nature that the flower fertilizes itself while still a bud, and is in no danger of cross pollination with an undesirable alien. If a seedsman is working with the brilliant new Bridal Veil Sweet Pea and wishes to perpetuate the unrivalled whiteness of the variety, he allows it to "jus' grow," like Topsy. The self-disciplining sweet pea will handle its own solitary confinement and do as effective a job as the best cheesecloth cage ever built.

The sweet pea shows the fallacy of keeping too much to one's self, however. When the seedsman wants sweet pea varieties to be sociable and mingle, he meets difficulties. It might be desired, let us assume, to create a sweet pea with the orange color of *Celebrity* and the size and vigor of the famous *Pinkie*. This would necessitate the pollination of *Celebrity* with pollen from *Pinkie*, or vice versa.

The sweet pea flower shields stamen and pistil so effectively that the seedsman would have to break open the protective case of the Bridal Veil flower, remove the anthers before they produced pollen and bring over from *Pinkie* its pollen, to be dusted on the stigma of Bridal Veil.

If the cross takes, however, and subsequent generations of the plant show it to be vigorous and to bear large, well-formed pink flowers, the seedsman's path is comparatively easy. He need not play the role of a warden watching over a prison of solitary confinement cells. He can leave the solitary confinement business to the sweet pea.

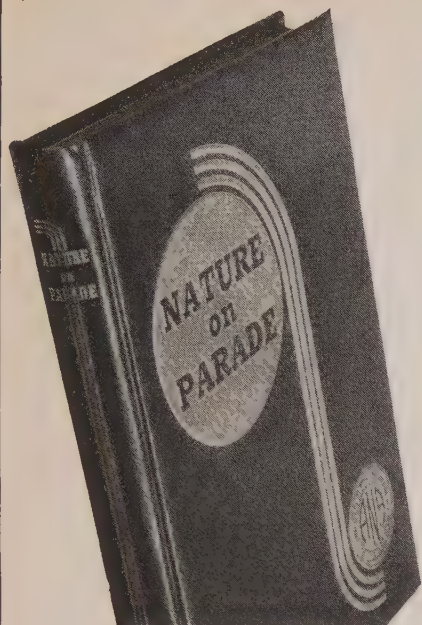
But there will be plenty for the seedsman to do, and there will be abundant opportunities for him to try his skill at managing solitary confinement cells for other flower families. Flowers and humans are brilliant and charming, but a bit of discipline now and then seems to have a tonic effect.

Florida Wild Flowers

In 1926, *Florida Wild Flowers* by Mary Francis Baker appeared and provided lovers of wild flowers with a splendid identification text. The volume has met with well-merited popularity and a new edition has now been published by Macmillan. This edition has been enlarged and more illustrations have been provided. A key index as well as a reference index make the book more valuable botanically. The edition sells for \$3.50.

Bird Houses

A new edition of *Bird Houses, How to Make and Where to Place Them*, by E. J. Sawyer, has been issued by the Cranbrook Institute of Science, Bloomfield Hills, Michigan. Copies of this booklet, of which the title is thoroughly descriptive, may be obtained for twenty cents.



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AMONG OUR AUTHORS

Hulbert Burroughs (Pleistocene Reborn) is a free lance photographer and writer, a graduate of Pomona College and resident of Los Angeles. He has travelled extensively in Lower California and Mexico in search of material, and was photographer for the Carnegie Institution-Pomona College Expedition up the lower Grand Canyon to the Rampart Caves, where remains of prehistoric ground sloths were found.

C. de Wendler-Funaro (Neptune's Gardens) has wide interests, ranging from marine algae to Gypsy folklore. A graduate of Cornell, where he majored in entomology, he has worked as assistant in entomology in the U. S. Department of Agriculture and at the American Museum of Natural History. He tells us that his "graduate work at Columbia was in romance languages, and these studies, combined with a deep interest in anthropology, led to gathering Gypsy folklore among the many groups of Gypsies in America and abroad. My interest in conchology and entomology has found expression in extensive collections of coleoptera, lepidoptera and shells, built up during the past twenty years." Just to round out his activities he spends weekends with seaweeds as an antidote for week-day hours in the classroom as instructor in modern language in a New York City preparatory school.

Ivan R. Tomkins (Red-jointed Fiddlers) is a native of Pennsylvania, born "not too late to be familiar with deep hemlock forests, or to see hillsides covered with immense chestnut trees." For the past fifteen years he has "lived on or alongside the lower Savannah River, ranging from the yellow water of the old rice-field marshes through the brackish areas and the salt marshes down to the beaches at the river entrance."

Edna P. Hoffman (Nature's Gristmills) is a St. Petersburg, Florida, newspaperwoman with two degrees from the Florida State College for Women. Having a college professor for a father and a high school teacher for a mother, she decided there were enough educators in the family and went in for journalism, with a particular interest in the outdoors and in natural science.

Warren C. Wilson (Visits with Western Alpine Flowers) is a student at Cornell specializing in botany, particularly alpine flora. He was a member of one of the American Nature Association's western trail parties in 1930, a youngster then with an avid interest in flowers and a knapsack bulging with pressed specimens.

Water and the World

Drought and floods have forced upon our attention the significance of water, and have shown us that there can be either too little or too much of it. Yet most people accept water as a matter of course and rarely stop to think of its vital part in shaping the destinies of nations and peoples. There is, therefore, both importance and interest in the little book, *A Story of Water*, written by Augustus Pigman with the editorial collaboration of Alice V. Keliher. Here we read the story of water down through the centuries and it is an exciting narrative, simply written for the average reader. This is a book that should be in every school library. It is published by D. Appleton-Century at \$1.50.

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Photographic Notes

BY SAMUEL BROWN

Flowers

The Nature photographer will find the next two months busy ones. Of particular interest are gardens and abundant individual flowers. Flower photography is simple if the right technique is used.

One of the most important points when making flower pictures is the use of the proper film. With many pictures of this kind the colors are incorrectly reproduced and give the wrong impression. In black and white photography, although the actual colors are not seen, it is important to give the correct monotone value in such a way that the shades of gray will give the impression of the values of the colors in brightness. Yellow and red, which predominate in flowers, are rendered on ordinary film as either dark gray or black. For this reason, it is necessary to use a panchromatic film which is sensitive to these colors.

Whenever possible, a suitable filter for absolutely accurate rendition should be used. For all modern-day films, a medium yellow filter will be the most suitable. This will hold back sufficient ultra-violet and blue to give good rendition. Another important aim is to show the fine petal and leaf details. This is a matter of exposure and lighting. Flower pictures, when properly lighted, should show no dark shadows, nor should there be strongly-lighted portions that will come out absolutely white. Gradation and detail in both high-lights and shadows should be plainly visible. This is accomplished by photographing either in the shade or during the early morning or late afternoon hours when the light is most diffused.

Exposures should be as nearly accurate as possible, so that the high-lights are not blocked or the shadows under-exposed. One of the most troublesome factors in photographing flowers outdoors is the wind, and there are few days when the air is so still that long



WATER LILIES ARE ATTRACTIVE SUBJECTS. TAKEN ON SUPER-SENSITIVE PANCHROMATIC FILM. $\frac{1}{2}$ SECOND, F22, XI FILTER

exposures may be given. Long-stemmed flowers are always moving a little, even on still days. In such cases, a shield of some kind should be erected behind the subject so that the wind can be shut off during the exposure.

Background is important because it determines the attractiveness of the picture. The point of view should be carefully chosen so that the most beautiful aspects of flowers and background are combined to make an interesting picture. When this is impossible, a make-shift background can be used consisting of a light or dark piece of neutral gray material. The former, of course, is used with dark blossoms, and the latter with light ones. Exposures in flower photography should be as short as can be made, retaining the smallest lens opening practical under the circumstances.

Small lens openings give the greatest depth of focus, and this is especially desirable when making close-ups. In most cases, it will be necessary to give short exposures, except on still days and when photographing short-

stemmed flowers. Then exposures of one second may be used.

Any of the panchromatic films available today will be useful in photographing flowers. When the light is good, the best film is a fine grain one, such as Panatomic or Finopan, which will permit huge enlargements to be made. When developing negatives on which flower pictures have been made, a fine grain, soft-working developer, such as D.76, should be used. This will give a long-scale negative from which beautiful enlargements showing the full texture of the blossom may be made.

Photographing flowers is, indeed, one of the most fascinating phases of Nature photography, and many delightful experiences may be had besides the real pleasure derived from such pictures.

Printing

(Continued from May issue)

For the amateur who wishes to mix his own solutions for printing, the following are recommended:

Universal Developer For Contact Printing
Water (About 125 degrees F.).....16 ounces
Metal (Elon, Pictol).....45 grains
Sodium Sulphite, Desiccated.....1½ ounces
Hydroquinone.....175 grains
Sodium Carbonate, Desiccated.....2¼ ounces
Potassium Bromide.....27 grains
Water to make.....32 ounces

The above solution may be used with all contact papers such as Velox, Azo, Convira and Apex. For use, dilute one part stock solution to two parts of water. If colder, blue-black tones are desired, dilute one part stock solution to one part water. A good acid hardening fixing bath may be made as follows:

Hypo 16 ounces
Water.....64 ounces

When thoroughly dissolved, add the following hardening solution:

Water (About 125 degrees F.).....5 ounces
Sodium Sulphite, Desiccated.....1 ounce
Acetic Acid (28%).....3 ounces
Potassium Alum 1 ounce

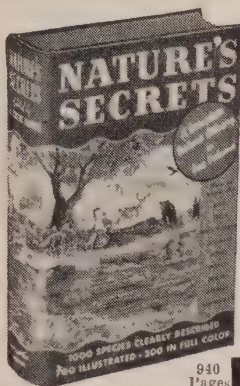
Be sure to dissolve the chemicals in the order given above, and it is necessary that



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each chemical be dissolved before another is added. Allow both solutions to cool, adding the hardener while stirring the hypo. If a number of prints are to be made in one evening, a short stop bath is desirable to prolong the life of the fixing bath, and may be made by adding 1½ ounces of 28% Acetic Acid to 32 ounces of water.

After all the materials and solutions are ready, it is most convenient to place them on the work bench as follows: Printing frame or printer on the left with the stock of sensitized paper within easy reach. Be sure that the glass is clean because if finger prints or other marks are visible, they will be seen in the finished prints. A small tray with the developing solution should be placed on the right of the



TAKEN ON SUPERSENSITIVE PAN-CHROMATIC FILM, F8, 1/25 OF A SECOND

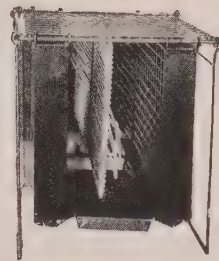
printer. Next to this, a second small tray with sufficient water or short stop should be close to the developing tray. On the right of this solution place a larger tray containing the acid fixing solution. All solutions should be at the same temperature, preferably about 70 degrees.

Most contact papers are supplied in from 4 to 6 grades of contrast, each one suitable for one type of negative. Number 0 paper is the softest. This is used for extremely hard negatives such as generally result from overdevelopment. Number 1 may be used with fairly contrasty negatives. Numbers 2 and 3 give good results from normal negatives with a long scale of tones. Numbers 4 and 5 are contrasty papers on which good prints may be made from negatives which are flat or weak over all.

Negatives differ essentially on two points, contrast and density. The contrast of a negative is the difference in density between the lightest, or most transparent portions of the negative, which represent the shadows, and the darkest, or most opaque portions, which represent the high-lights.

A weak negative is one in which there is little difference between the lightest and darkest portions, and should be printed on a hard paper such as number 4 or 5. Normal negatives have a long scale of tones in between. It is necessary to render each one of the different tones on the print in its correct value and, for this purpose, a number 2 or 3 paper should be used. Negatives with extreme contrast have strong opaque portions and almost transpar-

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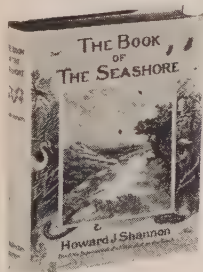
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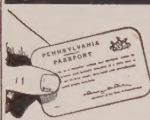
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(To be continued next issue)

Trade Hints and New Books

The newest edition of *Picture Taking At Night* is now ready. This booklet explains in detail various phases of night photography, such as portraits in artificial light, fireworks, street scenes, and many other interesting activities after the sun has set. Each reader is invited to send for his copy, which is available from this department without charge. Please enclose a 2c stamp for postage.

Owners of 16mm. motion picture cameras will be delighted to learn of the recently introduced Kodak 16mm. enlarger. This machine has much the appearance of a camera with an arrangement in the front into which the film is placed. An exposure of from 5 to 10 seconds with a photo-flood bulb on super-sensitive panchromatic film will give an excellent negative, from which prints and enlargements can be made. Literature is available from the Eastman Kodak Company, Rochester, N. Y.

One of the best and most novel ways of storing pictures is by means of the recently introduced *Fotofolio*. This is a leather covered volume with adhesive hinges on to which pictures are mounted. The pictures may then be examined on the hinged linen strips. An interesting booklet describing the *Fotofolio* is available from the manufacturers,

Wayne W. Light Co., 11 W. 42nd Street, New York City. Mention Nature Magazine.

Creative Camera Art by Dr. Max Thorek, F.R.P.S.—F.R.S.A., Fomo Publishing Co., 3111 Tuscarawas Street, West Canton, Ohio. Price \$3.75.

In the world of pictorial art, Dr. Thorek's name stands out as one of the foremost exhibitors in this country. Widely known for his pictures, Dr. Thorek is the idol of many amateur photographers. Dr. Thorek is best known for his outstanding pictures made via the paper negative method. Paper negatives offer one of the best and most flexible methods for individuality and the display of personal originality. There are many paths and byways that may be taken with paper negatives and no one is more able to lead authoritatively the way to accomplishment by this method. Dr. Thorek does more than explain how to create in his book—he dwells at length and in detail on the many steps leading to the making of a pictorialist. Posing, outdoor photography, figure photography, portrait lighting and many other subjects are discussed. We recommend *Creative Camera Art* to the coming pictorialist and as an inspiration to the lover of beautiful pictures.

The photographic department of Nature Magazine is edited for its readers interested in photography and maintains a service which renders assistance with any photographic problem. You are invited to take advantage of this service. Address all photographic inquiries to Samuel Brown, Nature Magazine, 1214 Sixteenth St., N.W., Washington, D.C.

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"And what about my mother? She's got marketing to do. Sometimes she needs to get in touch with Dad during the day. And there are errands to be run. Well, she can't do all those things without a telephone . . . and at the same time give me the attention I expect.

"All Dad needs to do to have a telephone is get in touch with the Business Office. I'd do it myself if I could just get out. But I can't. So is it any wonder that worry is keeping me awake half the day?"

B E L L T E L E P H O N E S Y S T E M



Indoors and Out

By HOWARD ZAHNISER

ON Independence Day ninety-three years ago a young man who was only a week and a day short of being twenty-eight years old took up his residence in a house (as he called it) of his own construction in the woods near Walden Pond, a few miles from Concord, Massachusetts. He lived there with a purpose for two years, wrote a book, conducted an experiment in economy, kept a journal, and left, thinking that perhaps he "had several more lives to live, and could not spare any more time for that one."

The book that he wrote was *A Week on the Concord and Merrimack Rivers*. His two years by the pond he described later in *Walden; or Life in the Woods*. The journal, begun earlier and continued until his death in 1862 (on May 6), was later published in four volumes of selections on Nature with the titles of the seasons, and finally practically in full. In his "several more lives" he traveled a bit in Maine and on Cape Cod, writing accounts later published; contributed essays to periodicals; lectured; expressed himself at times in poems; championed John Brown; and became one of the most significant Americans, with a meaning the influence of which has not yet ceased to grow.

When *The Works of Thoreau* (selected and edited by Henry S. Canby, Houghton Mifflin Company, \$5) appeared some months ago, it induced at least one New Year's resolution to read it through before July this year. With something approaching pride, it can now be reported that the resolution has been carried out, and the experience is something that can be recommended with enthusiasm.

With thoughts on July reading in mind, it has been pleasant to browse through writings with such flavor as Thoreau's journal entry on July 5, 1852: "The wood thrush's is no opera music; it is not so much the composition as the strain, the tone—cool bars of melody from the atmosphere of everlasting morning or evening." There has, however, been a timeliness in this reading of another sort, for it has provided a reference background for other current books, newly issued.

Charles Allen Smart's *R. F. D.* (W. W. Norton & Co., \$2.50), with its fascinating progress report on farm life by erstwhile city folk, would have brought Thoreau from the shelf even though the author had not actually invited comparisons with the Walden experiment. Thoreau was a man practically without money, and Smart had a few thousand dollars plus "a generous gift" and a good cash crop in his writings. Wildlife was an enriching part of the Walden surroundings, while Mr. Smart reports "the sad fact is that fairly conventional farm life, like ours, is conducive neither to friendships of this kind nor to true, fresh, and intimate knowledge of wild life," though perhaps he has set himself a very high standard; he says elsewhere he thinks he can see in his

dog's eyes that "a bird on the wing means more than something to be shot or spared." Mr. Smart's enlivened moments depend more on the stimulants of civilized man. He does not think "that any of us can afford to look at Nature and the major facts of the human situation while dead sober," while Thoreau wished to front life deliberately and "if it proved to be mean, why then to get the whole and genuine meanness of it." Yet these contrasts are important only because of underlying similarities. Both report searchings after a sound personal economy, and both reports are significant to the rest of us. Both take us nearer to what seems a natural living, and both whet our appetites for the out-of-doors, out of cities. In addition to being an experimenter in economics, Mr. Smart is also a creative artist in letters. He uses himself as a model in the same sense in which a painter uses self-portraits (the comparison is his), and *R. F. D.* has a resulting appeal to readers in general. It is indeed an exciting account of human experience.

The richness that a man may gain from the landscape without the benefits of agriculture is as well exploited in *Birds Against Men*, by Louis J. Halle, Jr. (the Viking Press, \$2.50) as it is in much of Thoreau's writings. Mr. Halle describes his work in one phrase as "a sober factual record of birds and events that once had a concrete existence," but his facts as he reports them stir the emotions and take on a significance beyond the fact. "The migratory passage of birds," he writes, for instance, "can be a great consolation to men whose minds continually search for an established order and progression in the universe." It is "the scheme of Nature" that he is sketching, whether the paragraphs at hand deal with the excitements of red-shouldered hawks mating near Mr. Halle's place at Pound Ridge in New York State, or with the colorful birds of Central America, where he worked for a while with a railroad. Drawings by Lynd Ward illustrate the volume.

In *The Fight to Live* (Frederick A. Stokes Co., \$2.50), Raymond L. Ditmars's descriptions of weapons, armaments, camouflage, and other modes of defensive living, produce a much more vivid consciousness of warfare, not of birds against men or men against animals but of all against all, men in one chapter, birds in another, and on down the line to the end of a stirring and informative work that is illustrated with photographs. It is an account of many struggles, analogous but not synthesized. Perhaps it exemplifies Mr. Halle's judgment that "the explosion of man over the face of the earth is too stunningly sudden to be understood in terms of the whole" and that "one must pretend that man is completely apart from nature, that this strange explosive phenomenon, Human History, has nothing to do with the obscure and ponderous unfolding of Natural History in which the birds play their part."

This, however, is a specu- (Continued on page 375)



A THREE-TOED, THREE-TON GROUND SLOTH

One of the great mammals of Pleistocene times whose remains are found in the La Brea asphalt pits, as now reconstructed by the Los Angeles Museum in Hancock Park, Los Angeles. Herman T. Beck, sculptor.